# FLIGHT

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Founder and Editor: STANLEY SPOONER.

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## Flight.

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## EDITORIAL COMMENT.

**Report of the Advisory Committee.**

The Report of the Advisory Committee for Aeronautics for the year 1913 has been published in advance of the Technical Report, which will appear in due course. It consists, as usual, of a summary by Lord Rayleigh, the President, and it forecasts in an interesting manner the more important contents of the Technical Report itself. On the present occasion Lord Rayleigh has detailed fewer specific conclusions than was the case in his report last year, and so it is not possible to pick out a similar number of interesting facts to be presented by themselves. It is even more evident than formerly, however, that the work of the Advisory Committee is rapidly striding towards the interior of an immensely important science.

Apart from the continuation of the investigations forming the major part of the contents of the preceding Technical Report, the newer work that will doubtless attract most attention is that relating to stability. Hitherto, it has not been possible to find time to carry out any experimental work under this head, for other matters of more immediate importance have occupied the entire attention of those engaged on the Government research. Lord Rayleigh forecasts, however, a very interesting contribution in the new report which is about to be published.

Another new subject that will especially appeal to the constructor relates to the investigation of the best design of float for hydro-aeroplane purposes.

It will be remembered that one of the most important contributions to the current Technical Report is that relating to the lift and resistance of wing sections; the next Technical Report will contain a memorandum on the application of such results to full-scale wings. In general, it appears, the full-scale results may be expected to be an improvement upon those directly deduced without correction from the model research: in short, the deductions from model research are on the safe side from the designer's point of view. A number of further experiments have been made to determine the effect of various modifications in the form of an aeroplane wing, particularly with a view to investigating the influence of the position of the maximum camber on the critical angle, at which a sudden drop occurs in the lift coefficient. It is desirable both that this drop should be as much as possible reduced, and that the angle at which it occurs should be as large as possible.

The report states that it has been found that great improvement in both these respects can be obtained by changing the position of the maximum ordinate. The result arrived at as the conclusion from this research is that the best position for the maximum ordinate is at a distance equal to about three-eighths of the chord from the leading edge. A slightly higher value of the ratio of lift to resistance can be obtained by moving the position of the maximum ordinate a little nearer to the leading edge—that is to say, to about one-third of the chord from the edge. But this reinstates the liability to uncertain flow, and the consequent serious character of the drop in the lift coefficient at the critical angle. The flow is very sensitive to small changes in the position of the maximum ordinate, but with this maximum ordinate in the best position the sudden drop in the lift coefficient is eliminated, and the lift maximum extends, with little diminution, over a considerable angular range.

The result of the later experiments has led to the selection of a particular form of wing known as R.A.F. 6 as being the most satisfactory from the standpoint of construction and aerodynamic merit. This wing section gives a lift coefficient of 0·32 at 5°, with a maximum lift resistance ratio of 14·3 and a maximum lift coefficient of

0·6 at 15°. The aspect ratio for which these values were obtained was 6 to 1.

Some experiments have also been made on wing sections, of which the surfaces are reflexed towards the trailing edge, in order to determine whether a reduction in the movement of the centre of pressure could be secured by this means. The experiments are not yet completed, but it appears probable that it will be possible to confine the movement of the centre of pressure within very small limits. As is to be expected, there is some loss of efficiency, but this is not of very serious amount.

A complete series of measurements has been made to determine the forces and moments acting on a warped aeroplane wing. The observations showed that no loss of lift resulted from warping at ordinary flight angles, but, as was to be expected, there was some increase in resistance. The effect of the movement of the centre of pressure for variation in the angle of incidence was negligible, and the lateral force tending to produce side-slip was quite small. As regards the rolling and yawing moments at small angles of incidence, the result of warping is to give a maximum rolling moment with practically no yawing effect, which is exactly what is required in practice. As the speed of the machine decreases and the angle of incidence increases, the effectiveness of the warp control gradually diminishes, while the yawing increases.

Further experiments have been made on aeroplane struts, including a systematic examination of a series of struts with sections of different fineness ratio. These tests, says the report, are of great theoretical and practical interest, and throw light on various points that arise on the one hand in connection with the design of airship envelopes, and on the other hand in relation to the tests of wings. The strut tests confirm the view expressed at an earlier date that the upper surface of a wing is of paramount importance, the effect of modification of the under surface being relatively small.

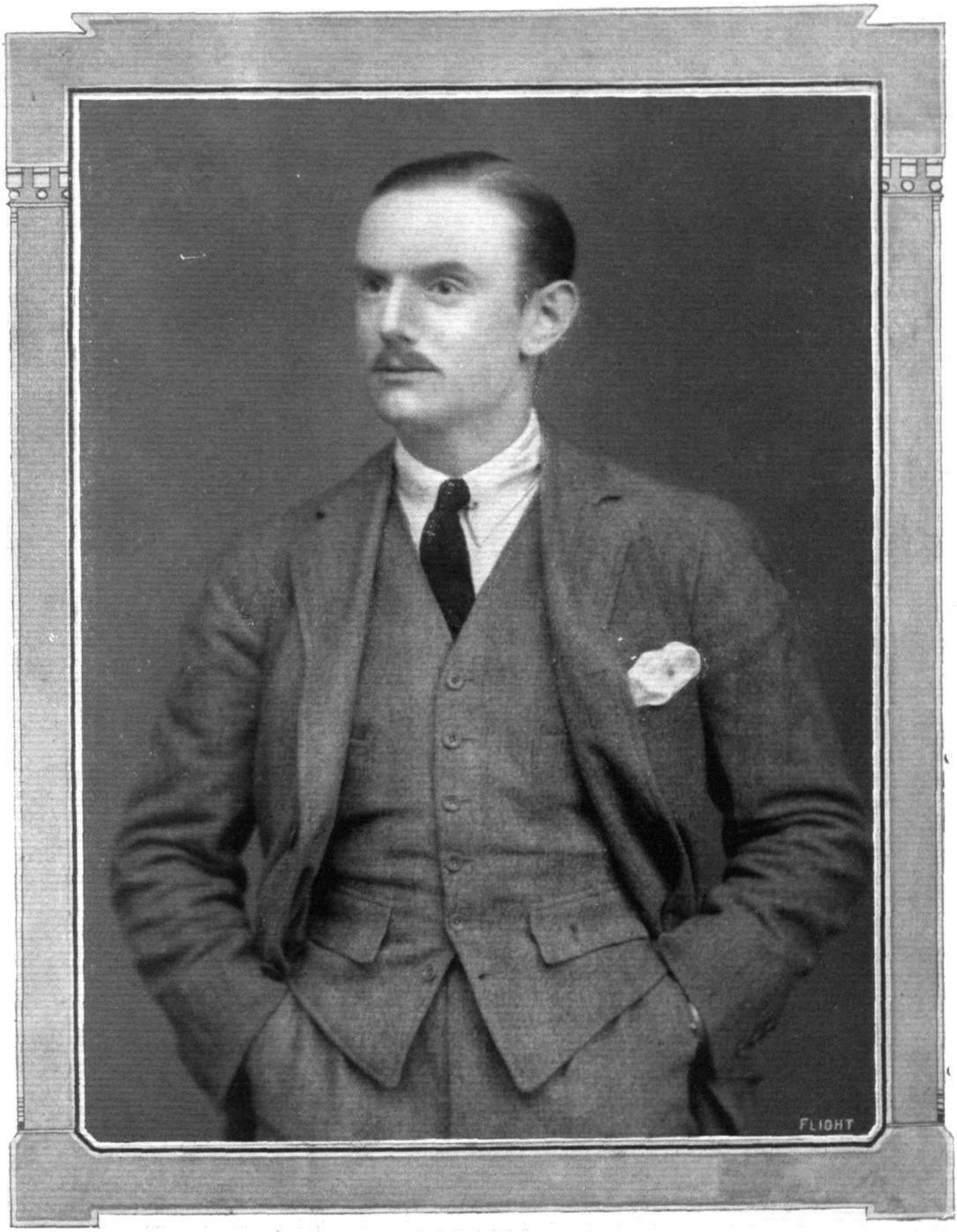
Discussing the subject of stability, the report refers to an interesting phase of the subject, brought to the fore by Mr. Lanchester and by M. Alexandre See, that too high a degree of stability in relation to small disturbances is not a desirable quality in an aeroplane, and that the condition to be aimed at is one of nearly neutral equilibrium. This view is entirely in accord with previous experience, in other problems of locomotion, among which may be mentioned the classical examples of the stage coach and the ship. In the former, too low a position of the centre of gravity, in the latter too great a metacentric height, were found to lead to unpleasant rolling motion. It will be evident, the report continues, that if, as is to be expected, the well-known theory that explains the cases cited is equally applicable to the aeroplane, it will be necessary for the conditions affecting stability to be determined with the highest possible exactitude, and with the utmost completeness, as somewhat nice adjustment will be necessary to attain the desired balance of opposing conditions. Whether as regards longitudinal or lateral stability, it would, from analogy, appear necessary that an aeroplane should be stable, but that its stability factor should not be too great.

We note that emphasis is laid on the need for an increased expenditure both on apparatus and staff at the N.P.L., and we hope that the Government will not stint the money for this good work, particularly in view of great scientific activity prevailing abroad.


**SHOREHAM HARBOUR AS SEEN FROM ABOVE.**—From a photograph taken by Mr. Clarence Winchester from Mr. Eric Pashley's biplane.

# MEN OF MOMENT IN THE WORLD OF FLIGHT.

## British Pilots.




MR. B. C. HUCKS.

# EIFFEL: AN ENGLISH TRANSLATION.

IT is no exaggeration to say that, in producing Mr. J. C. Hunsaker's translation of Eiffel's "Resistance de l'Air," Messrs. Constable and Co. have published one of the very few first-class contributions to aeronautical literature. The only pity is that it has not long since been available. Eiffel's original work is, of course, familiar enough in a general way to most English students, but except to a minority, thoroughly familiar with the language, we expect that it has never received the same intimate study and appreciation that will, we hope, be accorded to the Hunsaker version.

That the price of the book is two guineas, and, therefore, considerably more than the French edition, should in no wise stand in the way of its purchase by all who are seriously interested in that most important of all problems in flight, to wit the resistance of the air. Eiffel is the first and foremost experimenter on this phase of aviation, and his treatise might with some justice be called the only modern classic in the science, for there is nothing else of solo authorship that is up to date and of equal merit.

The Hunsaker translation of Eiffel is published in the same style as the original, but it reaches the purchaser well bound in a good stout cover, instead of in the more or less dilapidated condition so characteristic of the issues of the French publishing houses, whose custom is to provide only paper covers, on the assumption that the binding of a book is a vital matter of individual choice.

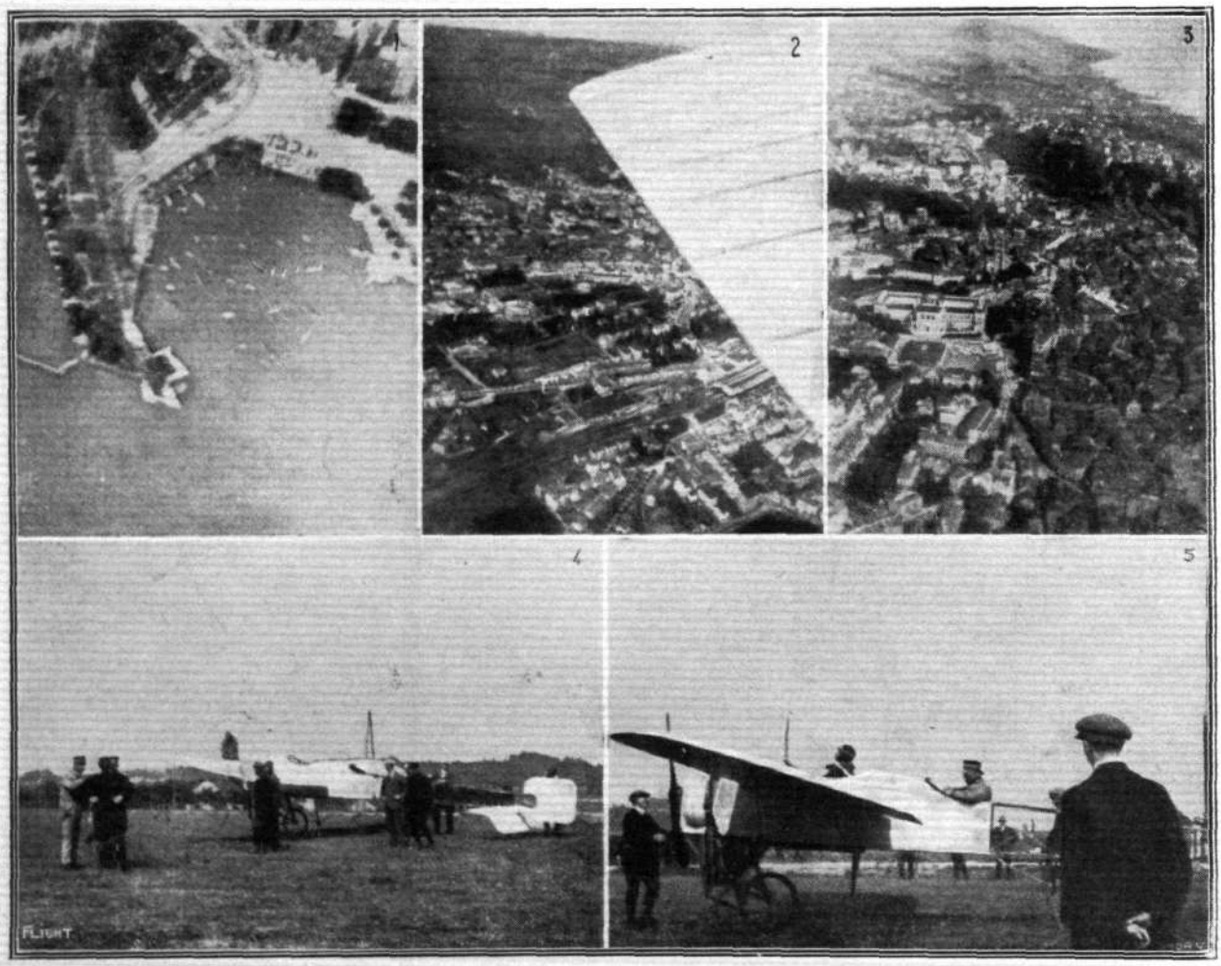
The English translation has also the further advantage over the French that it contains particulars of Eiffel's later experimental research at the new laboratory at Auteuil. These particulars are extracts from a communication made by M. Eiffel to the French Institution of Civil Engineers. The interest attaching to them is twofold, one being directly connected with the installation of the testing apparatus, and the other being embodied in the nature of the results obtained from the first experiments there carried out.

As everyone is aware who has paid any attention to the requirements of experimental research, it is extremely difficult to obtain a satisfactory wind tunnel in which to test model wings for lift and resistance. The size of the channel has to be very large in proportion to the size of the model, and a considerable amount of power has to be expended in driving the fan that maintains the artificial wind. Even then it is ordinarily only possible to obtain speeds that are considerably below even the slowest velocities of flight.

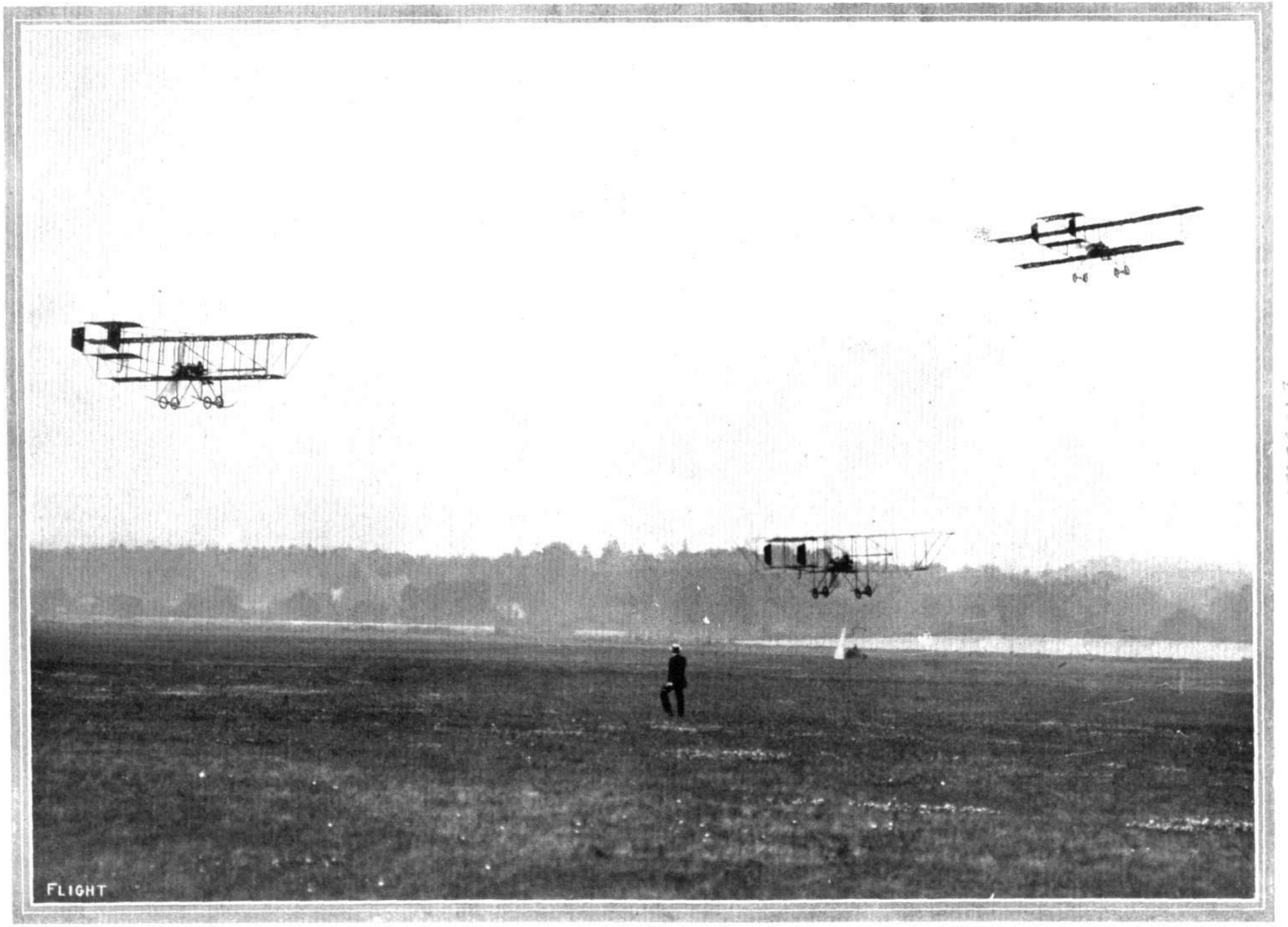
When M. Eiffel had to move from his old laboratory in the Champ de Mars, he decided that he would try and erect a wind tunnel in which he could maintain velocities more nearly in accord with those appertaining to practical flight. It was not so much that these higher speeds were in themselves desirable, as that there was still a little doubt whether the laws based upon the low velocity experiments could safely be applied without correction to speeds so much in excess as those corresponding to the full-sized aeroplane. The existence of a high velocity wind tunnel would not only afford means for directly testing the accuracy of the conclusions based on low velocity experiments, but in itself would serve perhaps better than anything else to remove the scepticism with which laboratory research is apt to be regarded by the so-called practical man, whose prejudice is mainly due to the fact that he hasn't taken the trouble to understand it.

It was all very well to say that a high velocity wind channel would be desirable, but quite another matter to carry it out in a reasonable form. M. Eiffel has the double advantage of being wealthy and generous, but his calculations soon led him to realise that if the high velocity were maintained under the same conditions as the low velocity, he would have to instal and maintain an engine of over 400 h.p. in order to drive his fan. The upkeep of such a plant, apart altogether from its initial cost, is an obviously serious item.

M. Eiffel and his engineers thereupon set to work to study the subject in all its scientific bearings, and eventually devised a system of trumpet-shaped orifices for the admission and exhaust of the air to the model chamber, which enabled the work to be done with a




MR. CORBETT WILSON IN SWITZERLAND.—Above are three views of (1) Ouchy, (2) Lausanne Station, (3) general view of Lausanne taken by Capt. Friedrich when passenger with Mr. Wilson; below (4) some of the Swiss officers who went as passengers with Mr. Wilson in conversation with him; and on the right (5) Capt. Instructor Lederry just about to take a flight with Mr. Wilson.—*Suisse Sportive.*




"Flight" Copyright.

CROSS-COUNTRY RACE AT BROOKLANDS ON SATURDAY LAST.—Mr. W. S. S. Mitchell on the Vickers biplane (No. 8); Mr. W. Bendall, Bristol biplane (No. 10); Mr. F. W. Merriam, Bristol biplane (No. 7), rounding the sheds on the first circuit.

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power expenditure of less than 50 h.p. This in itself will be recognised as an extremely interesting fact that is well worthy of the close attention of those who purpose erecting wind tunnels elsewhere.

It happened also that one of the first experiments conducted in the new laboratory was itself of singular interest and importance. It consisted of a test on a scale model of a complete biplane, the original of which had been flown by Lieut. Saulnier in a special laboratory constructed by Col. Bottieaux and Major Dorand, of the Chalais-Meudon school of military aeronautics.

This laboratory enabled straight line flights to be made in still air, and the aeroplane was fitted with recording apparatus that enabled the following things to be ascertained automatically and simultaneously by merely pressing a button at the appropriate time:—1, the thrust of the propeller; 2, the speed (revs. per sec.) of the propeller; 3, the air speed of the machine; 4, the angle of inclination. The weight of the machine was, of course, known in advance.

When M. Eiffel came to test the model, which was constructed to a scale of 1 : 14·5, he obtained a striking coincidence between his results and those derived from the full-sized aeroplane. In one case, every figure was found to lie upon the same curve in both tests, and in the other case five out of seven values similarly coincided.

As M. Eiffel very properly remarks, nothing could afford a better justification of the utility of the model research.

Among the other tests made in the new wind tunnel, were those that led to the construction of the Drzewiecki aeroplane, a curious tail-first design, the illustrations of which will be familiar to our readers. It was constructed in order to demonstrate the principle of longitudinal stability by means of the fore and aft dihedral, but perhaps the references to it in M. Eiffel's book scarcely do full justice to the universal acceptance of that fundamental principle in aeroplane design. It is, in fact, curious that this principle, which is perhaps more completely accepted than any other, is continually being exploited in all manner of special guises, which although novel in themselves, derive whatever virtue they may possess from a principle that is now becoming as old as the hills.

The practical realisation of the principle of the fore and aft dihedral depends on the leading plane of an aeroplane having a heavier loading (lbs. per sq. ft.) than the tail plane. In the case of a tail-first type of aeroplane, the main planes occupy the position of a tail plane, and must be less heavily loaded than the leading plane. In the case of an ordinary aeroplane, the main planes, being in front, must be more heavily loaded than the tail.

The distribution of the weight of the machine is such that the aeroplane is balanced fore and aft in its normal flying attitude. If the attitude of the machine changes, by a small amount, so that the angle between its axis and the relative wind is now, say two degrees less than formerly, then both the main planes and the tail plane will have suffered a similar diminution in their angles of incidence.

If the effect of this diminution is an equal loss of lift on both planes then the *proportionate* loss is less on the leading plane than on the tail planes, because the leading plane has the higher initial loading. The consequence of this difference is that the tail end of the machine tends to fall, and thereby to restore the normal attitude of the axis of the machine in flight.

If there is any difference in the absolute loss of lift on the two planes for a common change in the angle of incidence, it is, of course, important that the difference should not be such as to destroy the above principle. But from the evidence of practical aeroplane construction, it is apparent that there is no difficulty in acquiring a sufficient difference in initial loading to neutralise any individual differences in the characteristics in the wing sections employed for the main planes and the tail.

In this matter the tail-first type of aeroplane has the advantage of affording a wider range of attitudes for the stabilising organ. The chief consideration of the designer is, of course, the main plane, and if this happens to be very lightly loaded, the latitude for the adjustment of the tail plane so as to be still less lightly loaded is small. On the other hand, when the stabilising member is in front, it will have to be more heavily loaded than the main plane, and the latitude for doing this is, by comparison, unlimited.

Eiffel's later work at Auteuil has been directed towards the testing of propellers, for which he has a very ingenious apparatus. His propellers are tested in the wind tunnel, the draught being adjusted to the speed of flight. The propeller is driven from overhead by a vertical shaft and bevels. The motor that drives the propeller, and also supports it, is itself supported upon diaphragms, so adjusted that they record by means of gauges the thrust and the torque.

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## The Burton-on-Trent Meeting.

AUGUST 1ST, 2nd, 4th (Bank Holiday), and 5th have been decided upon as the dates of the meeting at Burton-on-Trent which is being organised by Messrs. Handley Page, Ltd. There will be two or three races each day, and the following prizes will be offered:—

Burton to Repton and back twice (4 miles each way). Prize £25.

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Altitude competition. Prize cup £25 (presented by Messrs. Bass and Co.), with £75 in gold.

Cross-country race to Atherstone and back (distance 18 miles each way). Prize £50.

Bomb-dropping competition, quick-starting competition, and passenger carrying will also be carried through.

The ground on which the meeting is being held is the one on which the successful meeting was held three years ago, and is being lent by Messrs. Bass and Co.


*Photo. by Butler and Ward, Chiswick*

**Visit of the Irish Millers to Hendon Aerodrome, Thursday, last week.—Around the tea tents.**

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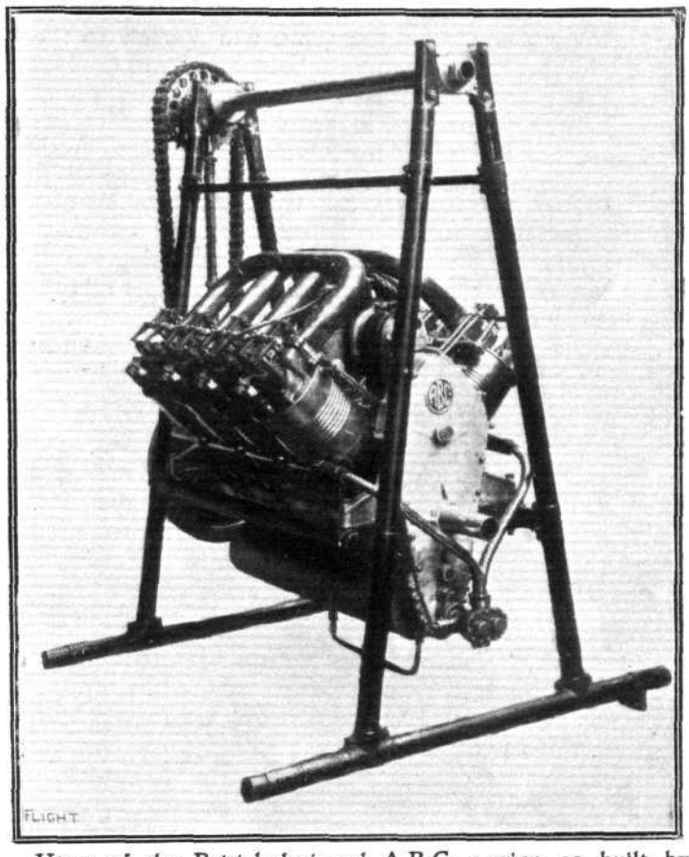
# THE NEW BRITISH-BUILT A.B.C. ENGINE.

THE importance to Britain of having British-built aviation engines can hardly be overrated. It is of the highest value, therefore, to know that for some little time such a firm as Messrs. Armstrong, Whitworth and Co. has been associated with the making of a British designed motor, the first of which has just been turned out from their works. The engine, for the construction of which they are responsible, is the already well known A B C, which has done so much good work at Brooklands, and has assisted in the making of several British records. There can be little doubt that with such an engineering



View of the British-designed A.B.C. engine as built by Messrs. Armstrong, Whitworth.

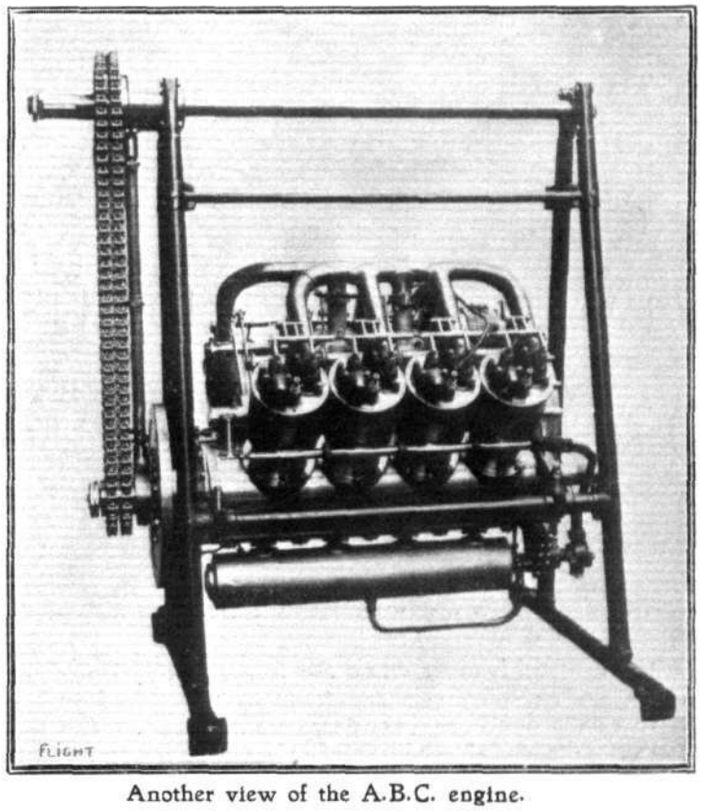
firm behind its manufacture, the impetus required to establish it in the foremost rank of efficient motors will now be forthcoming. Let us hope it is only the commencement of Messrs. Armstrong, Whitworth's association with aviation concerns.

The A B C engines are, as we have already said, already known to the users of aeroplanes, and the motor in question embodies several improvements upon its predecessors. It is still of the V-type, and has eight cylinders, the bore being 5 ins. and the stroke $4\frac{1}{4}$ ins. The cylinders are machined out of a solid bar of steel of very high tensile strength, a flange being left at the base for the purpose of attachment to the crank-case. As the latter is circular in section, the bases of the cylinders are cut out on a radius to fit the circumference of the crank-case, the cylinders being held down by bolts which pass through ribs machined inside the crank-case. These bolts are locked from the outside, as shown in one of the accompanying sketches, so that there is no danger of them coming unlocked and dropping down into the crank-case.

In the accompanying sketches are shown the cast-iron valve cages in which the overhead valves are held and which also form the valve seats. The inlet and exhaust valves as well as their respective cages are made interchangeable, the only difference being that the flange provided for bolting the inlet valve cage to the induction pipe has been cut off in the exhaust valve cage, as, in this particular engine, no exhaust pipes are fitted. The valve cages are held down to the top of the cylinders by four bolts and can be very easily removed for inspection.

The valves, which are of the flat-faced type, are made of a special steel which has been found to retain its strength even when almost red hot, so that no trouble is to be anticipated from breakage of the valves.

A pillar, bolted to the cylinder-head and silver soldered to prevent water leakage, carries a light shaft on which the rocking-arms operating the valves are pivoted. This shaft is composed of short lengths for each cylinder, suitably joined to give rigidity, and at the same time allow of the rockers of one cylinder being taken down without interfering with the rest. A special feature of this engine is the crank-case, which is very strong and at

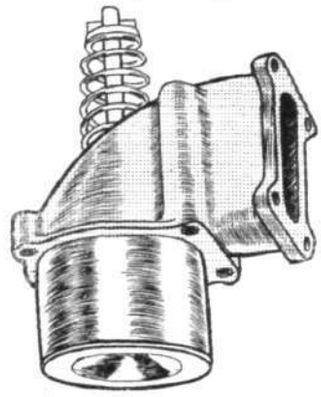


Another view of the A.B.C. engine.

the same time quite light—36 lbs. It is a steel forging of high tensile strength, machined inside and out. Ribs are machined inside to take main bearings and the cylinder holding-down bolts. The main bearings for the crank-shaft are phosphor-bronze castings, ribbed for stiffness and lined with white metal for bearings. The connecting-rods are steel stampings of H section, and have an oil channel drilled from end to end down the web. The small-end bearings connecting the cast iron pistons with the connecting-rods through the gudgeon-pin are provided with phosphor-bronze bushes locked in place. Bushes of the same metal are also used for the bearings of the big ends, which are of unusual

design in that they are not fitted with caps, but have a narrow band for holding the two halves of the bush together.

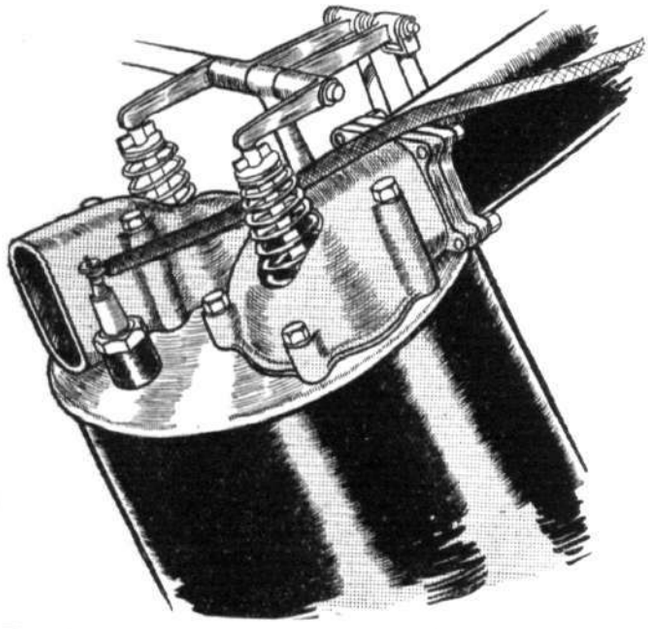
The crank-shaft, which is of steel, has four throws, each crank-pin taking the big-end bearings of two connecting-rods from cylinders on opposite sides of the crank-case. Bolted on to the front end of the crank-case is a steel plate with two transverse arms bolted to the engine frame, which, as the accompanying photos show, in this particular case is specially built for hydro-aeroplane purposes, in order to have the propeller-shaft above the engine. A ball-thrust bearing takes the thrust of the propeller when the latter is mounted directly on the crank-shaft, but in this engine, which is arranged to drive the propeller by means of a chain, a ball-journal bearing is fitted on the crank-shaft while a thrust washer and journal bearing are provided for the propeller shaft. A chain adjustment rod which has forked ends fitted to the ball bearings connects the two shafts. In this engine the flywheel is mounted on the forward extension of the crank-shaft, but provision is made for mounting it on the rear extension behind the gear case if desired. The gear case is made of aluminium and embraces all the gear wheels driving cam-shaft, oil and water pumps and magneto. The magneto is bolted to the cam-shaft casing—a phosphor-bronze casting mounted on top of the crank-case between the two rows of cylinders. The cam-shaft is machined out of one piece of steel and ground all over. Two carburettors are fitted, each supplying its row of cylinders through a four-branched induction pipe. The lubrication is positive throughout. An oil sump of tubular form is suspended from the bottom of the crank-case on four lugs, and a spur gear-driven pump situated well below the oil level in the sump delivers oil to the main bearings. The crank-shaft and crank-pins are hollow, and small tubes of slightly smaller diameter and expanded at the ends are provided, forming annular spaces which serve as oil leads. The lubricating oil passes through the main bearings to the annular spaces in the shaft, and thence to the spaces in the crank-pins. From the big-end bearings it travels up the oil channel in the web of the connecting-rod to the gudgeon-pin. From here it runs down inside the piston on to cylinder walls. Spun copper water-jackets are used, and the method of securing them to the cylinder is by silver soldering. Each jacket has its short length of water pipe joined to the pipe of the adjacent cylinder by the simple rubber-ring joint shown in one of our sketches.



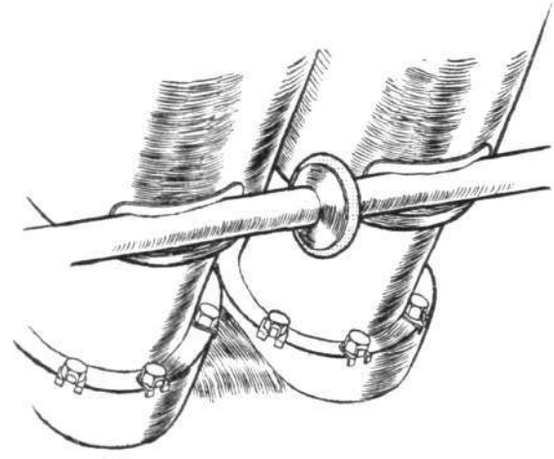
One of the valve-domes.

The engine, which weighs 375 lbs., develops 100 h.p. at 1,300 r.p.m., which is its normal speed, but we understand that a considerably higher horse-power has been obtained at an increased number of revolutions.

This engine is the first to be delivered of a batch now going through the Armstrong-Whitworth works, and needless to say the workmanship is excellent throughout. All parts are subject to severe tests before being assembled, and should the slightest defect be apparent the part is immediately rejected.



**Top of a cylinder with valve-domes, rockers and tappet-rods.**



**Sketch showing rubber ring joint in water-pipe.**

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### Pickles at Brighton.

THE huge crowds on the Brighton and Hove promenade on Saturday afternoon had an excellent opportunity of seeing a flight which they will not quickly forget. Sydney Pickles came over from Shoreham and supplied one of his Hendon spirals, much to the delight or fear of the many onlookers. He executed his "stunt" between the two piers, commencing the spiral at probably over 2,000 ft. He came down to almost 20 ft. of the sea, and then made over the West Pier back to Shoreham, climbing practically all the way. He was on the 45 h.p. Caudron doing his tests for the superior *brevet*, and returned to Hendon in time to take his place in the races.

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### To Eastchurch on a Caudron.

A VERY fine trip from Hendon to Eastchurch and back was made by Mr. Sydney Pickles on the British-built Caudron, which is fitted with a 45 h.p. 6-cyl. Anzani engine, on Thursday last week. Leaving Hendon soon after midday in a high wind he had a fast trip to Eastchurch, where he landed by a spiral into the naval grounds. After a demonstration flight, Mr. Pickles went over to the Isle of Grain to see about the engine for the Caudron hydro-aeroplane belonging to the Naval wing of the Royal Flying Corps, and then returned to Eastchurch for tea. He left for London at 6 p.m., and reached Hendon at 7.50, arriving at a height of about 6,000 ft.

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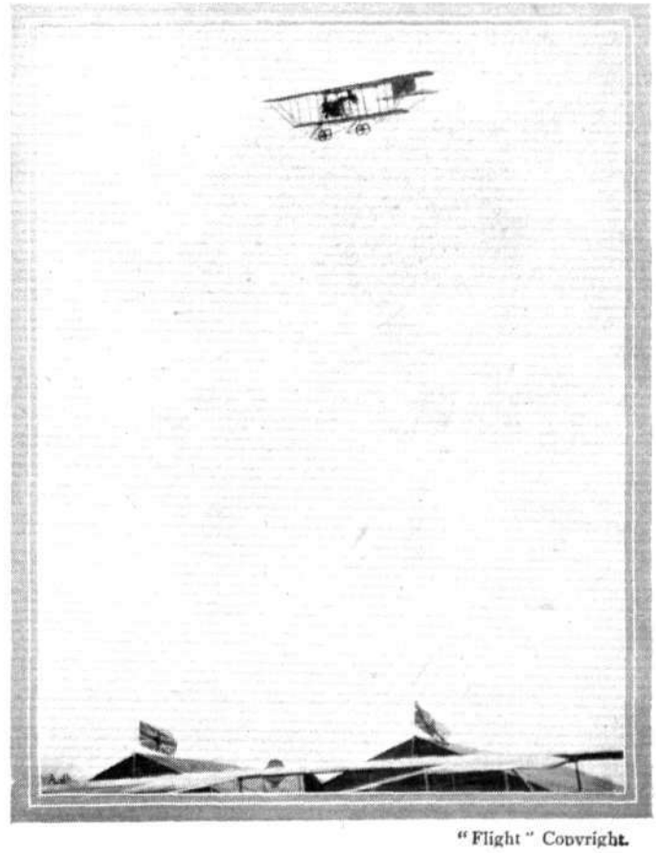
# A MAN AND A MACHINE.

THINGS move with remarkable swiftness in aviation. It is speed everywhere. Aviation itself has come upon us with remarkable speed. Aerodromes crop up in the form of a field and a couple of sheds, and in a few short months, before we seem to have time to look round, we have a fashionable racecourse and "White City" combined. Pilots come and go. The pilot of to-day is the memory of to-morrow, and the learner of yesterday is the man of the moment. Only a few weeks ago and Chevilliard was making us catch our breath with his remarkable flying on the Henry Farman at Hendon, now it requires something of an effort to remember just exactly what it was he used to do. We have not forgotten him, of course, but other men have come along to hold our attention, and we are essentially creatures of the moment. I first saw Sydney Pickles at Salisbury, only last year—a pupil—a learner. Nobody seems to take any notice of pupils, but some of them have a way of coming along and forcing themselves into a position where we not only have to notice them, but admire them. They seem to slip from the embryo to the concrete in a few moments, without any intermediate stage, and Sydney Pickles is one of them.

After Salisbury, he next appeared at Brooklands, and all I noticed about him was that he still wore the same hat with the striped band, and seemed very earnest about it all, but did not do much. Then little bits of news began to filter through. "Pickles was flying this machine" or "that machine." Pickles seemed to be flying all machines, everywhere. Then he got to Hendon. A few days, and he had taken out the little Caudron monoplane, that fast little machine which nobody seems to care to tackle, and flown it to Brooklands and back, in what I believe to be record time for the out and home flight: 12¼ minutes out, and 17 minutes back over a course of 21 miles—42 miles in 29¼ minutes, with, and against the wind, surely a fine flight. Then came the Caudron biplane, the Handley Page, the Blériot, and now the Caudron again; and, Pickles, this is your machine in my opinion. It is very noticeable, as time moves on, how certain pilots take to certain machines, and stick to them. We have Hamel on the Blériot, Pierre Verrier on the Maurice Farman, Chevilliard on the Henry Farman: pilots who fly those machines and no other; and this is, I think, as it should be, for no pilot flies every machine equally well. It is a combination of man and machine, and the men who are our greatest flyers—the men who earn the most money—the men whose names ring throughout the world, are the men who have found the machine to suit them, and stick to it; and for you, Sydney Pickles, it is the Caudron biplane, take my word for it. It has not been my pleasure to see other pilots of the Caudron outside this little isle, so I cannot say how they handle their machines; but I am sure that could our friend Rene Caudron have been at Hendon on Sunday week and have seen Pickles on the new Hewlett and Blondeau British-built 45 h.p. biplane, it would have done his heart good; it was wonderful.

Now as to the machine. It is the second of three built and building for Mr. Ewen, by Messrs. Hewlett and Blondeau, under licence from Caudron Brothers, and as a piece of workmanship leaves nothing to be desired, and could not have been beaten by Caudrons themselves. Could they see it, they would feel pleased and proud that the building of their machines in England had got into such good hands. I had a good look round it, and I had to admit that I had never seen a machine which surpassed it for the excellent way in which everything had been carried out. There is not one little part in the whole machine which one could point to and say that it might have been better done. It has been built, of course, exactly on Caudron lines, and coloured the "Caudron" blue, but owing to the slight yellow tint of the dope, in the air it assumes a pale green colour, and looks remarkably pretty. With the 45 h.p. Anzani engine now fitted, it is remarkably fast, and climbs like a rocket. I do not think I ever saw a biplane—with the possible exception of the Sopwith tractor—climb quite so rapidly. I should like, just as a sporting event, these two machines matched one day in an altitude contest, say, of five minutes' duration, which, taking into consideration that one is of 80 h.p. and the other only 45 h.p., should put up a most interesting event. I think little sporting matches of this description would create a deal of interest, and be very instructive.

And now for the machine and the man, as a combination. On the signal to let go, the machine ran a short, a very short, distance, and leapt into the air—simply leapt, there is no other word for it. In half a circuit of the aerodrome, Pickles had got her up to a great height, and in a very few minutes he was circling at an altitude of well over 3,000 ft. Then, right over the centre of the grounds, he commenced a spiral corkscrew dive of such small radius that from the ground it looked as though the machine was turning in very little over its own length, and diving at an angle that looked appalling. Round and down, down and round it came, accompanied every few seconds by those momentary little puffs from the



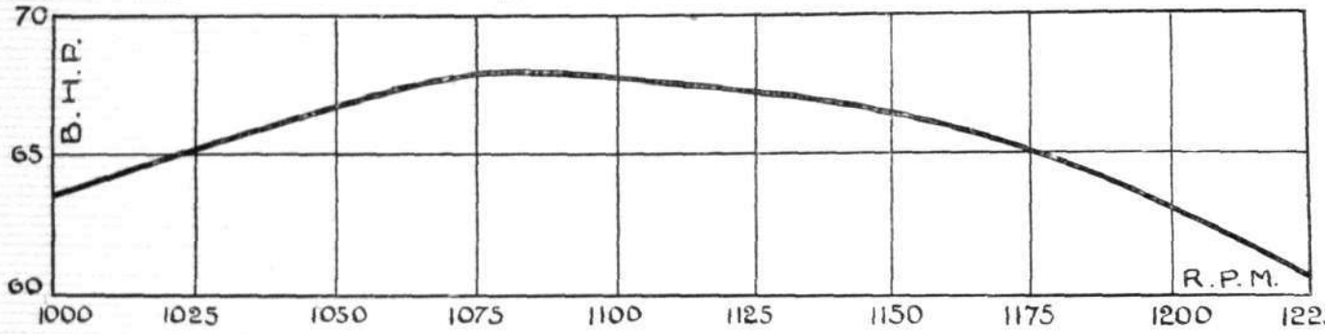
"Flight" Copyright.

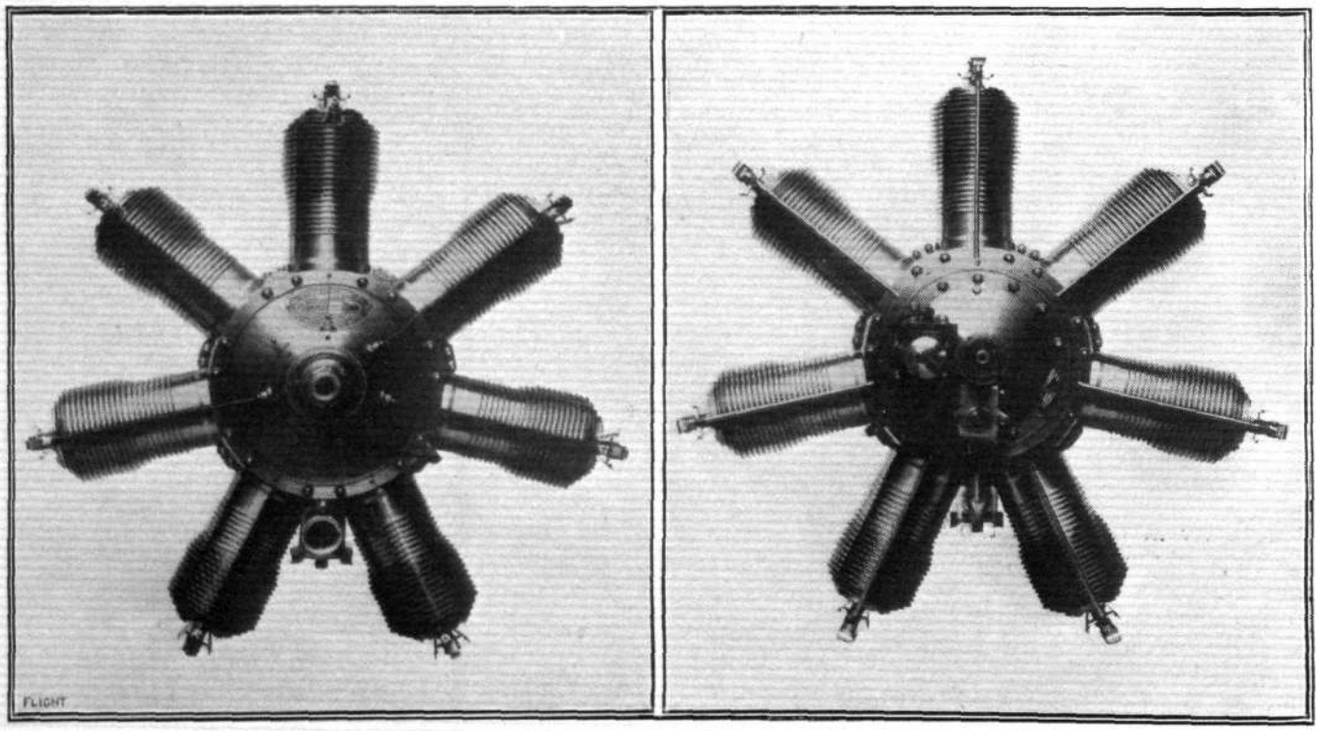
**Mr. Sydney Pickles, on the British-built 45 h.p. Caudron, making a fine straight *vol plané* over the sheds at Hendon.**

engine, until when within less than a hundred feet of the ground she flattened out splendidly, and went sailing off round the aerodrome. Coming back to near number one pylon, at a height of only about fifty feet, Pickles now set her to climb at a most terrific angle, and held her to it for so long that we on the ground thought he must surely overdo it, particularly as he was flying against a very strong head-wind. He must have made that poor little 'bus climb at least three hundred feet in one great slanting run, before getting on to an even keel, and it looked too much, though Pickles says it was not, and that he could feel her pulling all the time. Several more flights of the same character completed that day's performance, surely one of the most sensational flying exhibitions put up at Hendon since Chevilliard left us, and gave us a chance to breathe again. A wonderful pilot—a wonderful machine! The Pickles-Caudron combination should not be separated. H. E. S.

# HORSE-POWER CHART OF THE NEW 60-65 H.P. ISAACSON RADIAL ENGINE.

THE curve shows the variation of speed between 1,000 and 1,225 r.p.m. The maximum power output occurs at 1,080 r.p.m. and is 67·9 h.p. The weight of the engine ready for fitting into the same frames that support Gnome engines is 196 lbs.—viz., 3 lbs. per h.p. for 65 h.p. The petrol consumption at 64 h.p. is 3·8 gallons per hour. The engine is designed by Mr. R. J. Isaacson, and is built by Messrs. Manning, Wardle and Co., at the Boyne Engine Works, Leeds. The cylinders are machined from solid nickel chrome steel, and are held radially in a steel crank case. For the purpose of inspection the cover plates can be removed from the crank-chamber in about 6 minutes, and the pistons can be taken out through this orifice after the front part of the shaft has been parted by means of a special tool. The pistons can be removed and replaced without dismantling the cylinders. It is claimed that the engine can be completely dismantled in 22 minutes and reassembled in the same time. The manufacturers also state that the inlet valves will work equally well without springs. The engine is provided with a special distributor to facilitate self-starting on battery ignition or by means of a special magneto. The fuel supply is a direct feed through an adjustable cock and an airtight valve. The valve and cock are coupled to levers that moved together constitute the throttle control, and moved separately serve as an adjustment of the mixture. Inside the engine a perforated plate is arranged to intercept flame from flashing back to the carburettor, ordinary gauze having been found inadequate for this purpose.



# The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

### Balloon Race at Hurlingham.

THE Long Distance Balloon Race will take place to-day (Saturday) at the Hurlingham Club, Fulham, S.W., at 3 o'clock, for a Cup presented by Mr. A. Mortimer Singer.

Members will be admitted free to the Hurlingham Club on presentation of their Royal Aero Club membership cards.

The following is the order of starting :—

1. Dunlop (50,000 c.f.) Mr. F. K. McClean (Pilot), Com. C. R. Samson, R.N.
2. R.F.C. (95,000 c.f.) Major E. M. Maitland (Pilot), Major F. H. Sykes, Major R. Brooke-Popham, Major G. Raleigh, Capt. R. Pigot, Mr. B. H. Barrington-Kennett, Mr. R. Hargreaves.
3. Planet (80,000 c.f.) Mr. C. F. Pollock (Pilot), Mr. A. Mortimer Singer.
4. Banshee (80,000 c.f.) Mr. John D. Dunville (Pilot), Mrs. John Dunville.
5. Meteor (50,000 c.f.) Mr. L. H. Mander (Pilot), Lieut. A. E. Borton.

### Aerial Navigation Regulations.

On Tuesday last, the 24th inst., Col. H. C. L. Holden, C.B., F.R.S. (Vice-Chairman), Mr. Alec Ogilvie, Mr. T. O. M. Sopwith, Mr. R. W. Wallace, K.C., and the Secretary attended a conference at the Home Office, at which representatives of the Admiralty, War Office, and Home Office were present. The Chair was taken by Sir Edward Troup, K.C.B., Permanent Under Secretary of the Home Office. The Club delegates put forward certain recommendations with regard to the Aerial Navigation Regulations as affecting the *Daily Mail* £5,000 Prize, the Aerial Derby, and the Hurlingham Balloon Contests. These will be duly considered by the Admiralty and War Office.

### Public Safety and Accidents Investigation Committee.

This Committee met on the 23rd inst., when there were present :—Col. H. C. L. Holden, C.B., F.R.S., in the Chair, Mr. A. E. Berriman, Mr. F. K. McClean, Mr. W. O. Manning, Mr. Alec Ogilvie, Mr. Mervyn O'Gorman, Com. C. R. Samson, R.N. In attendance :—Mr. R. L. Charteris and the Secretary.

**Brooklands Accident.**—The Committee proceeded to enquire into the accident at Brooklands on the 13th inst., in which Lieut. J. R. B. Kennedy, R.N., was killed, and Mr. C. Gordon Bell was injured.

The following Members of the Accidents Committee visited Brooklands on Saturday, the 14th inst.: Col. H. C. L. Holden, C.B., F.R.S., Mr. A. E. Berriman, Eng. Lieut. C. F. Briggs, R.N., and Com. C. R. Samson, R.N., and a careful examination of the wrecked aircraft was made.

Messrs. Martin and Handasyde, the manufacturers of the aircraft, attended at the invitation of the Committee, and gave evidence.

Mr. R. L. Charteris, the Club's official Representative at Brooklands, submitted his report on the evidence which he took immediately after the accident.

The report was drawn up and ordered to be submitted to the Executive Committee.

### Protection of Wrecked Aircraft.

The following notice has been issued by the Home Office to the Chief Constables in all counties in England :—

"Home Office, Whitehall,
"12th June, 1913.

"Sir,—I am directed by the Secretary of State to inform you that he has been in communication with the Royal Aero Club on the steps to be taken to secure a thorough investigation being immediately made by an expert in the case of all serious accidents to aeroplanes and airships, and to prevent the wreckage of the machine and all *débris* belonging to it being removed from the positions where they fell until expert examination has been made. It is important in the public interest that the causes of accidents to aircraft should in all cases be thoroughly investigated, not only for the purposes of an inquest when death is caused, but with a view to discovering means for preventing other accidents; and as the Club has the best expert assistance at its command, it has been arranged that, immediately on notice being received of an accident, an expert will be sent to the place for the purpose of making the examination, and that the Club's representatives will be provided with a special badge for purposes of identification.

"The Secretary of State will be glad if you will instruct the members of your force to assist in this matter as far as possible in the event of an accident occurring in your district. This can best be done by sending immediate information of the accident by telegram to the Royal Aero Club, 166, Piccadilly, London, W. (Telegraphic Address, "Aerodom, London," Telephone No. 1327 Regent), by rendering the Club's representative when he arrives all reasonable assistance, and pending his arrival, by taking effective steps to prevent any unauthorised persons interfering with the wreckage or removing any part of it.

"No disturbance whatever of the wrecked machine should be permitted except for the purpose of extricating the occupants, and any portion of it which may have been necessarily disarranged in so doing should carefully be restored to its place by those who moved it, a note being made of what has been done. In the event of an inquest being held, it is of great importance that the wreckage should be kept as far as possible *in statu quo*, and that all broken portions of the machine should be carefully preserved and identified.

"If there is reason to believe that the aircraft belongs to the Admiralty or the War Office, no telegram to the Royal Aero Club is necessary, but a telegram should be sent, in the case of an Admiralty aircraft, to the Commanding Officer, Naval Flying School, Eastchurch (Telegraphic address, Aeroplanes, Eastchurch); and in the case of a War Office aircraft, to the Officer commanding the Military Wing of the Royal Flying Corps, South Farnborough (Telegraphic address, Aeronautics, South Farnborough), adding, if possible, the number of the machine.

"An officer will then be sent by the Naval or Military Authorities, as the case may be, to take charge of the machine and to arrange for the necessary naval or military inquiry.

"Should the police, owing to difficulty of identification, report an accident to the wrong authority (*e.g.*, a Service aircraft to the Royal Aero Club, or a Military aircraft to the Naval Authorities) the authority receiving the telegram will take the necessary steps to forward the information to the proper quarter.

"I am, Sir,
"Your obedient Servant,
"EDWARD TROUP."

### Competitions Committee.

This Committee met on the 23rd inst., when there were present :—Col. H. C. L. Holden, C.B., F.R.S. (in the Chair), Mr. Ernest C. Bucknall, Mr. J. T. C. Moore-Brabazon, Mr. E. V. Sassoon, and the Secretary.

***Daily Mail* £10,000 Prize Cross-Atlantic Flight.**—The regulations for this prize were finally approved.

166, Piccadilly, W HAROLD E. PERRIN, Secretary.

## THE ROYAL FLYING CORPS.

THE following appointment was announced in the *London Gazette* of the 24th inst. :—

**R.F.C.—Military Wing.**—*Special Reserve of Officers.*—Arthur Ashford Benjamin Thomson, to be Second Lieut. (on probation). Dated June 25th, 1913.

The following appointments were announced by the Admiralty on the 19th inst. :—

*Royal Naval Reserve.*—Acting Sub-Lieuts. R. L. G. Marix and H. A. Littleton appointed Sub-Lieuts., to date November 1st, 1912, and to Hermes, additional, for Naval Flying School as Flying Officers, May 17th; D. G. Young appointed Sub-Lieut., to date June 14th, and to Hermes, temporary, for Naval Flying School, June 14th.

The following appointment was announced by the Admiralty on the 23rd inst. :—

Assistant Paymaster C. R. Finch-Noyes, lent for course at Central Flying School, to date July 1st.

### The Desertion of Larkhill.

Now that No. 3 Squadron of the Royal Flying Corps is installed in new quarters at Mile Ball, Larkhill has been deserted. The No. 4 Squadron, which has been transferred from Farnborough to Salisbury Plain is quartered at Netheravon. No 5 Squadron is now being formed at Farnborough and Major Higgins, D.S.O., has been nominated to the command.

# THE BURGESS FLYING BOAT.

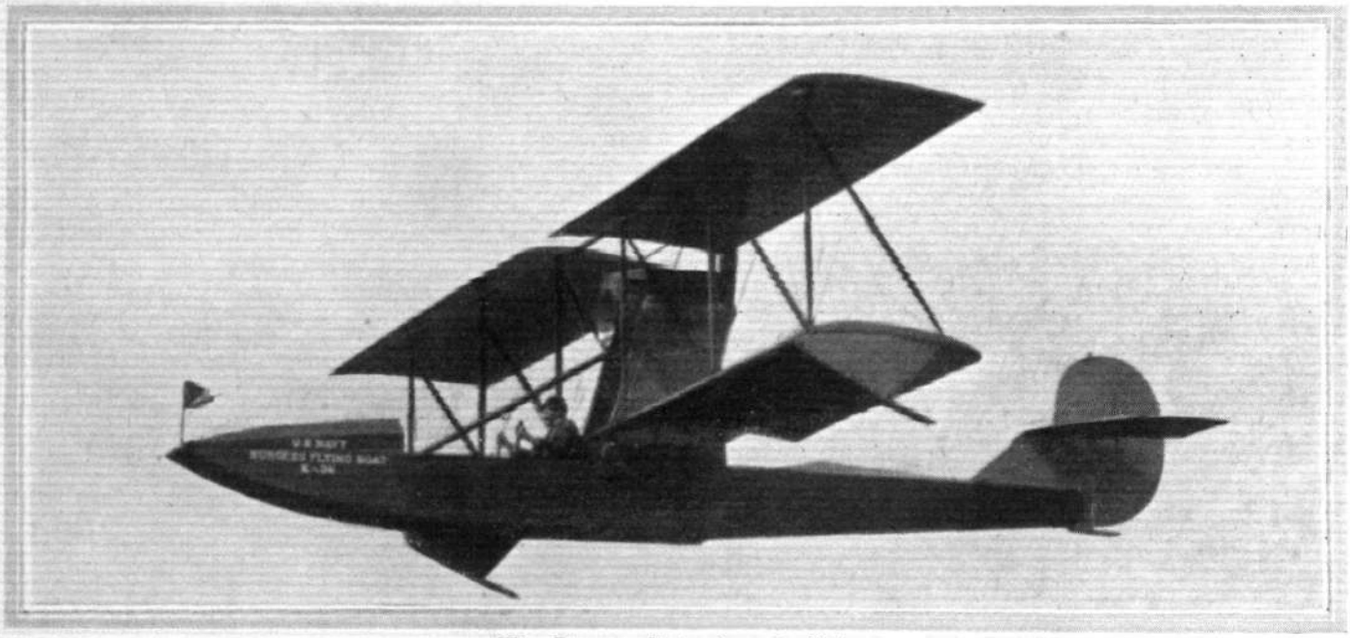
IN this country the type of hydro-aeroplane commonly known as the flying boat, has, up to the present, not come in for much prominence, although several designers are giving a good deal of attention to its problems. In France, and more especially in America, however, it is being constantly experimented with. Scarcely a week passes without a new design appearing in the States, where several have proved quite successful, and it may almost be said to be the fashionable type of aircraft.

Our scale drawings this week are of one of this type of craft—the Burgess flying boat—which was designed to meet the requirements of the United States Navy, and passed all its tests quite successfully in the hands of Frank Coffyn. Its hull, power plant, and main planes each form separate units, which can be assembled and taken down in a very short time.

From the plan view of the machine it will be seen that the sides of the boat are parallel from the prow to a point just behind the trailing-edge of the lower main plane. From there they taper to a vertical knife's edge at the stern. Spruce and oak are the woods used in the construction of the framework of the boat, while the planking consists of two layers of mahogany separated by fabric. The boat is built up of two detachable sections, secured to one another by quickly detachable steel fittings. Two seats, arranged in tandem, are situated in the front part, giving the pilot and passenger an excellent view of all that is beneath them. From his seat the pilot controls the machine through the usual Wright-type levers, which consist of an elevating lever and a combination warp and rudder lever.

One of the most interesting points of this machine is the construction of the main planes. While the lower plane is of the usual Burgess biplane section with two main spars, the upper plane is of a modified monoplane section and has only a single tubular spar situated approximately on the centre of pressure. The top plane is staggered forward, bringing the spar nearly in line with the leading edge of the lower plane. The two planes are connected by six vertical struts, and in addition there are six diagonal struts running from the rear spar on the lower plane to the tubular spar on the upper plane. The lower plane is rigid, and only the upper plane is warped for maintaining lateral stability. From a point on the leading edge of the top plane, just in front of a vertical strut, a cable passes round a pulley at the base of the strut, and is carried right across to another pulley at the base of a corresponding strut on the other side of the machine. By this arrangement the trailing edge is kept from dropping down when the machine is at rest. In a similar way the warping-wires, passing round pulleys at the base of the struts and secured to the ribs at a point roughly half-way between the spar and the trailing edge, take the load when in flight. The ribs of the top plane are made a loose fit on the tubular spar, so that when the trailing edge of one section is pulled down the leading edge moves upwards.

As the diagonal struts are hinged in the centre the wings may be folded by undoing the forward warping wire and folding the diagonal struts. The hinged joint between the planes and the vertical struts then allows of the trailing edge of the top plane dropping down. The trailing edge of the lower plane is then raised so that the planes lie flat against the struts. The wings can then be pulled out of their sockets and shipped as a unit.

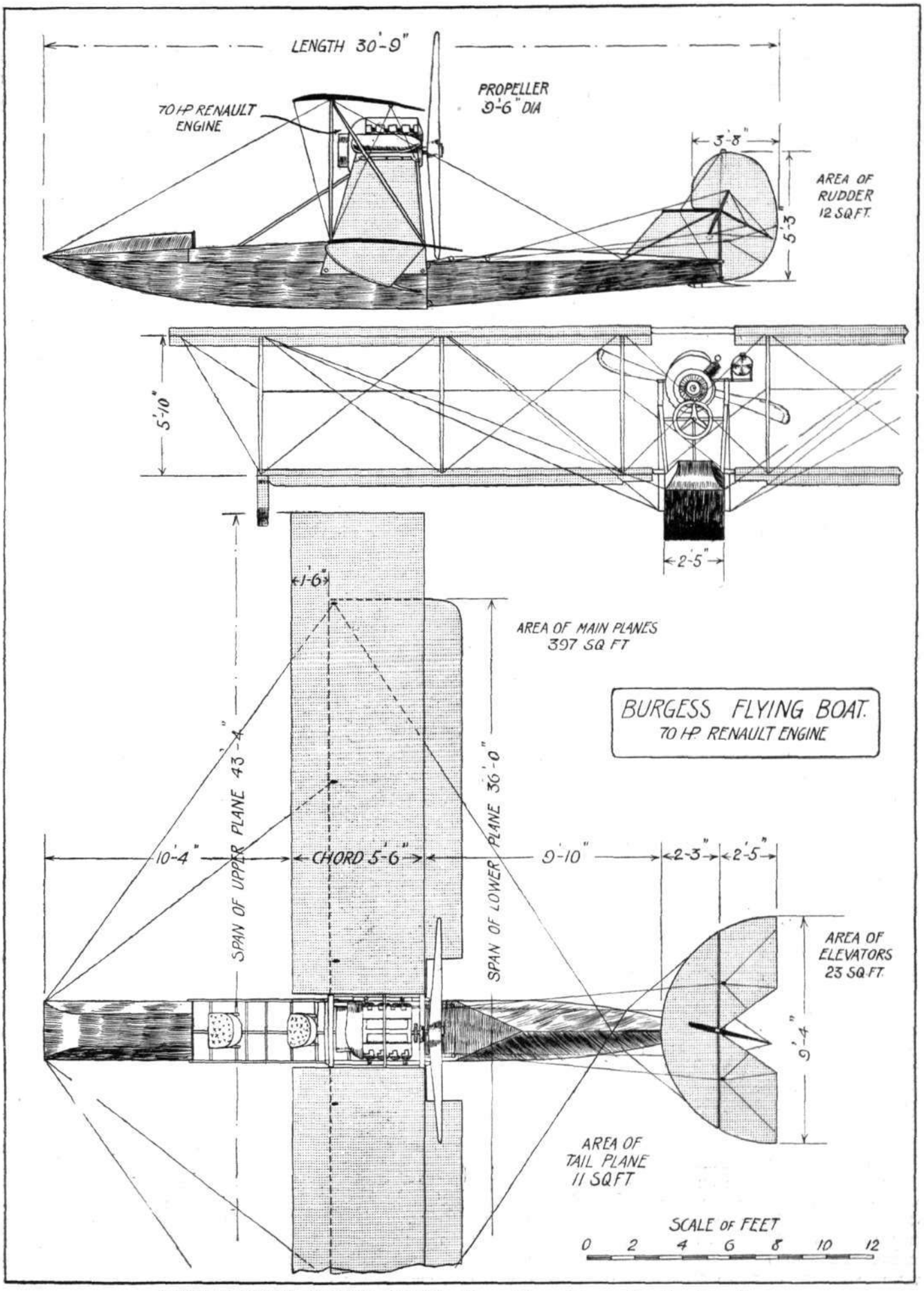


The Burgess flying boat in flight.

Carried on an engine bed constructed of ash members is the 70 h.p. 8-cyl. V-type engine driving a Chauviere propeller. The engine and its supports form a separate detachable unit. Two stout ash struts running from the engine bed to the forward part of the hull prevent the engine from being carried forward owing to its momentum when alighting on the water.

Petrol is carried in two tanks with a total capacity of 42 gallons, and situated in the central part of the boat. A small pump, driven by a miniature propeller, forces the petrol from the main tanks into a service tank above the engine, and it runs to the carburettor by gravity.

At the rear of the boat are mounted the tail planes. The balanced rudder is used for steering, both in the air and on the water. The fixed tail plane and the elevators form a semicircle, with a portion cut away to permit of movement of the rudder. A small vertical fin is interposed between the boat and the fixed tail plane. The weight of the machine — including pilot, passenger, 48 gals. of petrol and 4 gals. of oil—is 2,100 lbs., and its flying speed is 62 miles per hour.




**THE BURGESS FLYING BOAT.**—Plan, side and front elevation to scale.

# ARMCHAIR REFLECTIONS.

By THE DREAMER.

## Thank You, Mr. Megaphone Man.

I HAVE noticed this week end at Hendon that the two announcements of which I spoke a fortnight back have been dropped; and the change is for the better. Moving about in the enclosures as I do, I have noticed that people used to laugh after they had heard it for the twentieth time, and although it is the business of the management to provide amusement for its visitors, this was not quite the way to do it. I noticed also, that there were not so many people out on the course, and I saw a good few try to get on under some excuse or other, and get turned away, and I was pleased.

I must not say any more nice things about you just yet, or people will think I hold a good block of shares in your company. I wish I did!

## Whew, Guess it's some Warm!

This is just the weather when I wish I were an aviator. Fancy, on a day like this, when the mercury is trying its best to push the top out of the thermometer, being up in an aeroplane, with the cool breeze whistling about one's ears: it makes me perspire to think about it.

I really think it would be a good idea to take one's summer holidays aeroplaning. Why not? It might appear at first sight to be a bit expensive, but, when you come to work it out, I don't know that there is so much against it. In all probability in a few years it will be quite the thing. With a base at, say Hendon, and a nice two-seater, some very enjoyable trips out and home to the coast could be made each day. Travelling expenses would be saved, and one could sleep at home each night, saving the "small" amount generally paid for so-called "apartments." I don't suppose I shall have the luck for it to come my way this year, so I am thinking of the next best way to keep cool, and I have given my vote to sitting on a block of ice, up to my neck in the sea, eating ice cream with an icicle, meanwhile a shower bath of American iced drinks plays upon my venerable cranium. If that won't do the trick I had better get a job as a salamander. Yet there is at least one man in London who can keep cool, even now. I discovered him to-day in Trafalgar Square, and he was an American. I was waiting for a 'bus, and he came up to me. "Say, can yer set me course for Cranbourne street?" I explained to him where it was—we could nearly see it—"Say, could yer just tote me round? There's no derned blocks in this almighty city, and I keep coming out at the same place again." I gave him a miss in baulk. There are a good many men in London nearly as cool as my American friend, but not quite. You will find them outside the Hendon aerodrome, any day when there is flying on. They bring their best girl to see the flying, and then make her stand outside and catch a glimpse of the machines now and again, when the gates happen to be opened to let a car through. When a good position can be obtained inside, for such a small fee as sixpence, this meanness passes my understanding. One can understand it with small boys, who, most likely, have already spent their Sunday halfpenny; but when I see the hundreds of men out there with real nice girls, who have to keep dodging about to try and see an aeroplane, I feel like treating them all (the girls, I mean) myself. I wonder if it ever strikes them that they are doing a nasty, mean action, standing there to see free of charge that which costs no end of money to produce, just because it is impossible to carry the fence right up to the sky? They are the sort of men who will find a knot-hole in a hoarding round a cricket ground, if it cost them the first day of the match, rather than pay threepence to go in like men. I know this is all a waste of time writing about them like this; they will never see it, unless somebody happens to leave FLIGHT in the train. The idea that they would ever buy one is out of the question.

## I Have Broken Out in a Fresh Place.

I don't know why it is, but every now and again I feel that I must write verse. I suppose, if I were younger, I should find some lady to act as receiving office for my effusions, and pour lyrics in by the ream, to the amusement of counsel later, and "much laughter." As, however, I happen to have joined the noble army of martyrs, and having no other outlet, I must needs let into you. Now then, get a good grip and hold tight.

THE HUM OF THE FIFTY GNOME.

Give me the hum of the fifty Gnome,
  Flying o'er hill and dale,
Taking me whither I care to roam,
  To uplands, or sun-kissed vale.
Take me away from the busy street,
  Away from the township's toil;
Give me the hum of the fifty Gnome,
  The taste of the castor oil.

Give me the hum of the fifty Gnome,
  Give me the chance to go
Over the city's cross-topped dome,
  Over the hills of snow.
Never was loved one half so dear,
  Never was voice so sweet;
Give me the hum of the fifty Gnome,
  The feeling of icy feet.

I had thought of going into twenty verses with the above, just to relieve the heat-pressure; but I feel a bit better now, so will let you off and promise not to offend again for quite a long time.

## The Art of Being Miserable.

I have had one or two letters recently (kindly meant, I am sure) from some who think I am on the down-grade because I refuse to be miserable, and because I go motoring on Sunday instead of going to church.

There is a great art in being miserable. I know, because I have made a study of the subject during many years, and many people have come under my scrutiny during that time. It might be thought that, to be miserable, all one has to do is to walk about with a long face, and refuse absolutely to smile under any circumstances whatsoever. That, my friends, is only the outward and visible sign that the person afflicted belongs to the order, and is no criterion as to the qualifications of the wearer as a killjoy.

Your real "misery" carries a "presence" with it, a sort of halo, like a fungi-stricken fly on the window pane; but, whereas the fly affects only its immediate surroundings, the other puts out tentacles whose business it is to seize on to anyone who appears to be filled with the joy of living, and show them the error of their ways. Ruskin once said that education was "not teaching the youth of England the shapes of letters and the tricks of numbers, but the training them into the perfect exercise and kingly continuance of their bodies and souls." I don't know whether he entirely escaped the attentions of

the order during his period on earth, but I am quite sure they would have a grab for him were he here now.

Mr. Plowden said, ironically, a few days ago: "This is not a country where people can afford to be jovial. You must cultivate a spirit of melancholy if you want to be safe. Go away, and be as sad as you can."

I cannot tell you how to be miserable: at least I could, but I am not going to. There are quite enough of that sort in the world now. But I can tell you how to be happy. Work hard, and lead a healthy life. Get all the out-door exercise you can; if the necessities of livelihood keep you shut up all the week, get it on Sundays. Churches and chapels teach the highest form of morality, while indoor city life tends to reduce the health of the body on which vigour of character and strength of mind depend. Mix with good people, and go to good places for everything you require. Try to see the beauty in all nice things: music, flowers, pictures, the country side, the sunset. Try all you can to give pleasure to others, and see you get some yourself at the same time. Do unto others just what you ought to do according to the dictates of your conscience. If your conscience gives you the slightest hint that something is not right, it is wrong; you need not stop to analyse it for one moment. Your conscience will not keep you straight; it is not given to you for that purpose; it is just a delicate form of antennæ which warns you that all is not right, and it is your strength of character and bodily vigour that causes you to draw back at once. It is necessary for the well-governing and safe-keeping of a people that religion in some form or other should be taught, but unless the body is in a strong, healthy condition all the preaching in the world will fail to keep a man straight. The degenerates are more often those of poor bodily health than those mentally weak. If I go motoring or visit one of the great aerodromes on a Sunday, I may yet be doing the best I can to lead a straight life; and I can praise with all humility and with true appreciation the great Architect of the Universe, when I gaze on the view from the top of Reigate Hill or some other point of vantage.

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**A Zeppelin Hangar at Leipzig.**

AT the opening, by the King of Saxony, of the new dirigible shed which has been erected at Leipzig, the two Zeppelin liners, "Sachsen" and "Victoria Louise," the former with Count Zeppelin in charge, cruised from Potsdam to Leipzig, doing the 110 miles in about 2½ hours. The new garage is 194 metres long, and will accommodate two Zeppelins. It has a full equipment of meteorological and wireless telegraphy instruments.


**THE LONGEST DAY.—The annual pilgrimage to the sun temple at Stonehenge to witness the rising of the sun when it casts the shadow of the Heel Stone directly on to the altar stone—a moment of great significance to the sun-worshippers. Above is seen a Bristol biplane flying over the ruins upon the occasion.**

# FROM THE BRITISH FLYING GROUNDS.

**Brighton-Shoreham Aerodrome.**

THE admonishment "Wake up, England!" does not now apply to Shoreham, for matters here are looking decidedly brighter, and much more flying and practical work is being done. Wednesday last week Geere was testing, preparatory to handing the machine over to Shaw, who executed some really fine curves in a 10 m.p.h. wind.

On Friday morning early Geere tried the air, and subsequently Shaw had 40 mins. doing circuits and other evolutions.

Saturday, the 60 h.p. E.N.V. Avro was out. In the morning Mr. Eric Pashley, on his H. Farman, flew over Bungalow Town and indulged in one or two fancy flights. About 3 o'clock in the afternoon, Mr. Sydney Pickles arrived from Hendon on his superior *brevet* test, and passed on to Brighton, where he gave quite a startling exhibition. He returned to Shoreham, making a fine spiral descent, and subsequently leaving for Hendon. The 'bus was a 45 h.p. Caudron. Mr. Pashley gave a good display after Mr. Pickles had left, and after tea he was good enough to amuse the public with some stunt flying. He was out again on the following day in a wind of anything between 20 and 30 m.p.h.

**Brooklands Aerodrome.**

ON Thursday, last week, Mr. Hamel flew over on his new 80 h.p. Blériot (two-seater), leaving the machine at Brooklands in readiness for passenger flights on the Sunday. Only 20 mins. were occupied for the journey from Hendon, notwithstanding a strong wind.

Lieut. Noott, one of the Bristol pupils, on Friday carried out his *brevet* tests in splendid style, attaining an altitude of 1,000 ft., the highest ever reached by a Bristol pupil on a biplane.

On Saturday the Cross-Country Aeroplane Handicap, over a course of about 12 miles, provided some most exciting and interesting racing, the winner being Mr. W. G. Mitchell (a pupil of the Vickers school), who handled his machine in a manner worthy of a seasoned pilot. The second man was Mr. F. W. Merriam, the popular manager of the Bristol School. Mr. Maurice Ducrocq was third. The first four men were all on biplanes. Mr. Bendall was fourth on another Bristol biplane, Mr. Barnwell being fifth on a Blériot monoplane. At the end of the first stage there was great excitement as three biplanes rounded the pylon in a bunch, but the situation was cleverly saved by Mr. Bendall, who dived at the critical moment. Mr. Spencer retired on account of engine troubles. Mr. Knight on the Vickers monoplane was fast overhauling the leaders in the last stage and looked like winning easily, when he had a slight mishap and had to make a hurried descent into a cornfield. Mr. Hawker on the Sopwith tractor biplane was rather heavily handicapped. The weather conditions for the race were ideal, with the exception of a slight haze.

Mr. Hamel, in a strong wind, gave some very fine exhibition flights on Sunday, in the course of which he took up some well-known members of Society, with one of whom he attained an altitude of 7,000 ft. He also flew over the Hut Hotel at Wisley, and did some fine spirals there, to the great entertainment of the guests at that well-known hostelry.

The winner of last week's ballot for the free passenger flight (Mr. J. H. Brownrigg, of 15, Quarry Street, Guildford), and this week's (Mr. T. C. Ralli, of 22, Bryanston Street, Marble Arch, London), both enjoyed cross-country trips with Mr. Hamel. The only biplane to venture out was the Bristol, piloted by Mr. Merriam, who made one or two circuits in a very gusty wind. Mr. Barnwell, on the Blériot monoplane (single-seater), also made some fine cross-country trips.

**Bristol School.**—Merriam with Capt. Shott for trial on Monday last week; later, behind this pupil for straights, and also Lieut. Newton. Lieuts. Morgan and Noott good solos with figures of eight. Mr. Grahame Harris circuit, Merriam solo to finish.

On Tuesday, Bendall for trial. Mr. Skene following on figures of eight, and also Lieut. Noott, two flights each. After trial in the evening, Bendall out behind Lieut. Newton and Mr. Grahame Harris for solo. Bendall twice as passenger with Capt. Shott on straights and circuits, also behind Lieut. Newton on straights.

Bendall for test on Wednesday, then up with Mr. Pendlebury (a new pupil) for three flights. Later with Capt. Shott and Lieut. Newton. Too bumpy for further school work. In the evening, Merriam for test with Mr. Pendlebury as passenger, but found too bumpy. Later Bendall tried with Lieut. Newton as passenger, but still bad.

Merriam for a couple of circuits on Thursday, taking Capt. Shott as passenger, but found extremely gusty. When the wind dropped a little, Merriam took Lieut. F. MacNeece (prospective pupil) for a good flight, afterwards up behind Capt. Shott on several straights, and then behind Lieut. Newton. Bendall then away with Capt. Shott on straights, and afterwards with Lieut. Newton. It was then too bumpy for further flying.

Bendall for test on Friday, then with Capt. Shott and Lieut. Newton and Mr. Pendlebury, giving them two good trips each sitting doing straights and circuits. Merriam for a high flight, afterwards up with Mr. Pendlebury, letting pupil have control. Bendall behind Lieut. Newton on several straights and circuits. Afterwards Merriam took a passenger for a short trip. Then Lieut. Noott away for his ticket, taking same in very excellent style, reaching about 1,000 ft. in his first test, and landing right on the mark. His second test was at about 500 ft., with nicely banked turns, doing a *vol plané* to mark. Darkness stopped further flying.

Flying impossible until 9.10 a.m., on Saturday, when fog cleared. Merriam then for test, then up with Lieut. Newton, afterwards took pupil to Chertsey and back. Too bumpy for further flying. Merriam and Bendall out testing different machines, then both in for cross-country race, Merriam coming in second. Afterwards giving an exhibition flight, and later instructing Capt. Shott on straights and circuits, sitting behind. Bendall then out with same pupil. Mr. Skene two figures of eight in good style. Capt. Shott made his first straights alone, flying very well. Bendall finished up with a solo.

**Vickers School.**—Monday morning, last week, Capt. Wood, Major Brancker (pupil), and Knight solo on biplane. Barnwell and Knight with pupils, Elsdon and Webb, on biplane. Mr. Andreae solo on No. 2 mono. Mr. Beevor on No. 2 mono. had the misfortune to break a skid and propeller in landing. In evening, Barnwell solo on biplane, and with pupils Elsdon and Webb. Knight on biplane with Lieut Smith, Mr. Elsdon, and Mr. Webb. Barnwell testing No. 5 mono.

Tuesday morning, Barnwell and then Major Brancker solo on biplane. Barnwell and Knight with Messrs. Elsdon and Webb alternately on biplane. In evening, Barnwell and Knight on No. 5 mono. Knight with Mr. Elsdon on biplane, Major Brancker solo.

Barnwell and Knight, with Capt. Balfour, on biplane, Wednesday. Major Brancker solo, Barnwell and then Mr. Mitchell on No. 3 mono. Major Brancker then went for his *brevet* (on biplane), and took same in very good form, flying very steadily in bumpy wind, and landing with *vol plané* close to mark on each occasion. In the evening, Barnwell and Knight on biplane, the latter with Lieut. Smith. Barnwell on No. 5 mono.

Barnwell and Knight on biplane, Thursday morning. In the evening, Barnwell and Knight on No. 5 mono., Knight on biplane with pupils Elsdon and Webb, Mr. Mitchell straights on No. 5 mono.

Friday morning Knight and Barnwell on biplane with Messrs. Elsdon and Webb. Knight, Mr. Mitchell, and Barnwell on No. 5 mono. In evening, Barnwell and Mr. Orr Paterson on No. 3 mono. Knight and Barnwell on biplane, the former with Mr. Elsdon, and then with Mr. Webb, this last-named pupil landing very heavily and doing considerable damage to machine.

Saturday afternoon, Messrs. Barnwell and Mitchell on biplane, Knight on No. 5 mono. Mr. Barnwell on Blériot monoplane, Mr. Mitchell on biplane, and Knight on No. 5 mono., then took part in race described elsewhere. Knight had specially hard lines, as when looking like a certain winner, he had to make a forced landing in a cornfield, owing to *empennage* working loose, doing some damage to machine. Mr. Mitchell, the winner, made a really excellent flight on school biplane, going round pylons in quite professional style.

**Eastbourne Aerodrome.**

ON Friday morning last week Fowler tested the new biplane which the Company have built for school purposes. The machine behaved very well, and should prove a useful asset to the school.

Saturday turned out a beautiful day, and a considerable amount of flying was done in the afternoon. Gassler made one particularly fine flight on the 50 h.p. Gnome-Blériot, getting up to 2,500 ft. in very quick time. Later on he flew along the sea front as far as the pier. Fowler was busy all the afternoon with pupils; he also gave several passenger flights. Messrs. Morkill, Fill and Bevis were the only pupils present, and they all put in some excellent practice. Mr. Morkill was flying quite well, and with a little more landing practice he should soon be able to take his certificate. The new biplane proved a great success, Fowler used it the whole afternoon, and made over a dozen ascents, carrying a passenger on nearly every occasion.

**London Aerodrome, Collindale Avenue, Hendon.**

**Grahame-White School.**—School started 5 a.m. Monday last week, Lieut. Boddam Whetham solo straights, Lieut. Eales straights with Instructor Manton.

Wednesday, Mr. Manton circuits on Blériot. Mr. Carr circuits and figures of eight on biplane under Instructor Cheeseman.

Friday, Lieut. Boddam Whetham straights, Lieut. Eales straights,

Sir A. Sinclair straights and circuits, with Instructor Manton behind; Mr. Carr circuits with Mr. Cheeseman.

On Saturday, Lieut. Eales straights. Lieut. Boddam Whetham straights, Mr. H. E. Russell straights with Instructor Manton behind. Mr. Carr solo circuits.

**British Deperdussin School.**—In early morning Monday last week Col. Smyth 50 mins. straights on No. 3, much improved. Mr. Jaques on No. 2; carburettor caught fire, and engine smothered in sand. In evening, Col. Smyth 15 mins. on No. 3.

Before breakfast Tuesday Col. Smyth and Lieut. Brock each had 30 mins. at straights, right and left hand turns, both showing marked improvement. Col. Smyth out again in evening for a few more straights. Mr. Spratt also made several fine solo flights on 60 h.p., then two flights with Mechanic Harkness.

Col. Smyth started early Wednesday, and got in 10 minutes at right and left turns on No. 3. At end of one flight he forgot to flatten out before landing, and the 'bus suffered considerable damage. Mr. Spratt up again in 60 h.p. in the evening, landing with beautiful spiral *vol plané* with engine stopped.

Friday, Mr. Murray 10 mins. on No. 2, doing rolling and hops. Mr. Brock won speed handicap, Saturday afternoon, on No. 5 machine.

**Blériot School.**—On Monday morning, last week, at 5 o'clock, Capt. Cox was out doing straights on No. 1 taxi followed by Mr. Gower on same machine. In a short time, however, the wind rose and further practice was discontinued until the evening, when Capt. Cox again went out on No. 1 for straights and Lieut. Low and Mr. Gower were on the taxi for rolling practice. Next morning Lieut. Low was first to arrive and had a good practice on No. 1. Mr. Williams, alternating with Capt. Cox, did several very good straights, and both these pupils are coming on very well. In the evening Capt. Cox, Lieut. Low and Mr. Gower were all at work again and doing very well. Mr. Corbett Wilson, accompanied by his mechanic, Potet, left for Hampshire in a strong wind in the afternoon and arrived in very good time on his 80 tandem.

On Wednesday, Lieut. Low and Messrs. Williams and Gower all put in good work on No. 1, and Capt. Cox was doing well also, but unfortunately, when travelling along the ground at a high speed, came suddenly upon some sheep hidden in a hollow; the only way to avoid killing them being to lift the machine, he unhesitatingly essayed his first flight by pulling the taxi up to 15 ft. and keeping keeping her there for 100 yds. when he landed, being so unlucky as to damage the machine slightly in so doing. It was fortunate he did not take the chance of the sheep moving away, as familiarity with them has had the usual result, and they refuse to give way to anything that flies or rolls. Mr. Hamel, meanwhile, was giving joy-rides on his new 80 h.p. tandem to several friends and acquaintances, including his mechanic Goudre and Messrs. L. Seymour Metford and R. B. Slack.

**W. H. Ewen School.**—On Monday, last week, the pupils were out at 4.30 a.m., when M. Baumann, after testing the 35 h.p. Caudron No. 1, handed the machine over to Lieut. Bewes and Messrs. Gist and Warren, who were doing straights and half-circuits. Pilot F. W. Goodden, after testing the 35 h.p. Caudron No. 2, handed machine to Mr. Jagenberg, who was making progress in straights, while Capt. Jennings and Mr. T. H. Bayetto were rolling on same machine. All the above pupils were again out at 6.20 p.m., including Mr. Dalrymple-Clark, all making excellent progress.

School at 4.10 a.m. Tuesday, when M. Baumann, after testing the 35 h.p. Caudron No. 1, handed machine to Lieut. Bewes, who after flying several circuits went for his *brevet* test, which he passed in a brilliant manner, flying at an average altitude of 300 ft., and landing on the mark. Mr. Prosser was afterwards doing half-circuits on the same machine. Messrs. Russell and Bayetto were also doing good flying work on the Caudron No. 2, while Mr. Dalrymple-Clark was rolling on the same machine. The pupils were again out at 6.30 p.m., when the above pupils, including Capt. Jennings, put in further excellent practice.

M. Baumann out at 4.20 a.m. Wednesday, when, after testing the 35 h.p. Caudron No. 1, he handed machine to Mr. E. T. Prosser who started off for his *brevet* tests, which he passed in excellent style, flying well and landing near the mark. H. Gist was also doing good circuits on the same machine. Mr. Jagenberg was making excellent progress in short flights on 35 h.p. Caudron No. 2, while Messrs. Dalrymple-Clark and Capt. Jennings were rolling on the same machine. Mr. T. H. Bayetto also made several nice flights on the 35 h.p. Caudron, making good landings. Pupils again out at 6.10 p.m. M. Baumann made test flight on 35 h.p. Caudron No. 2, and then handed machine to H. Gist, who was doing circuits. Mr. Jagenberg was hopping and making straight flights on 35 h.p. Caudron No. 1, and Capt. Jennings and Mr. Dalrymple-Clark were rolling on same machine.

Thursday was too windy for school work. At 12.55 Mr. Sydney Pickles started off for Eastchurch on the new 45 h.p. Caudron biplane, doing the journey in 40 mins. Returning in the evening, he appeared over the aerodrome at about 7,000 ft., and descended with right- and left-hand spirals.

At 4.30 a.m. on Friday, M. Baumann made test flight on 35 h.p. Caudron No. 2, when he handed machine to Messrs. W. Warren and A. L. Russell who were doing circuits. Mr. Jagenberg was making excellent short flights on same machine, and Capt. Jennings was making good progress in rolling. School again out at 6 p.m., when M. Baumann, after test flight on 35 h.p. Caudron No. 2, handed machine over to Messrs. Warren, Gist, and Goodden, who were flying circuits well. Mr. Jagenberg was also getting on well with straight flights. Mr. Dalrymple-Clark rolling and hopping, and Capt. Jennings rolling.

Pupils out 4.30 a.m. Saturday, when M. Baumann after test flight on 35 h.p. Caudron No. 2, handed machine to Mr. Dalrymple-Clark, who was rolling and hopping, and Capt. Jennings rolling on same machine. During the morning Mr. Sydney Pickles started off for Brighton for his superior *brevet* on the 45 h.p. Caudron biplane, arriving at the Shoreham Aerodrome in 1 hr. 35 mins., having twice been lost in fog. Returning to Hendon later, he did the return journey in 1 hr. 10 mins., thereby doing the return journey well inside the specified time.

School out at 4.30 a.m. on Sunday, when M. Baumann, after test flight on 35 h.p. Caudron No. 1 handed machine to Messrs. Dalrymple-Clark and Jagenberg, who were doing good straight flights, while Capt. Jennings was rolling on same machine.

**Temple School.**—George L. Temple was out at 3.30 a.m. on Wednesday last week, testing the Caudron for 15 mins. Mr. Douglas Ritchie then flew two circuits in good style, and R. Penny, M. Lance, A. Vaile each had 10 mins. in straights, all landing well. Lieut. Maurice Ambler then flew a circuit, landing well. Lieut. Gran, a new pupil, was rolling on Blériot No. 2. Later in the day G. L. Temple was flying well in a bumpy wind. On Thursday morning, G. L. Temple found the air too bad for pupils; later in the day he gave an exhibition flight, and took as passengers in turn, Mr. J. L. Hall and his sister. At 4 a.m. on Friday, G. L. Temple made a test flight of 13 mins., D. Ritchie then flying for 8 mins., later making figure eights. This pupil is now ready for his *brevet*. Lieut. Ambler also flew circuits, handling machine well. R. Penny made left-hand turns, and A. Vaile and M. Lance had 10 mins. on straights. Mr. Gran showed improvement on Blériot No. 2. On Saturday, at 6 a.m., G. L. Temple flying for 15 mins., handing machine over to D. Ritchie for circuits and figure eights. Lieut. Ambler also on circuits, and R. Penny doing well on turns.


*Photo. by Butler and Ward, Chiswick.*

**Mr. H. A. Vernon, President of the National Association of Millers, about to have a flight at Hendon with Verrier in a Maurice Farman.**

Messrs. Vaile and Lance 10 mins. straight flights. Mr. Gran out on Blériot No. 2. In afternoon, George L. Temple gave an exhibition flight, and flew in the speed contest.

**Salisbury Plain.**

**Bristol School.**—Jullerot in sociable monoplane on Monday, last week, and Pizey in biplane for trials. Pizey with Lieut. Miley, R.N., twice, and Capt. Barnby, Mr. Garnett and Capt. Popovici excellent solos on side-by-side monoplane, the latter two, one at 500 ft. and one at 1,000 ft. in capital style. Busteed on sociable monoplane with Lieut. Beroinade twice, and Lieut. Pascanu. Mr. Garnett good monoplane solos with nicely banked turns. Pixton in Bristol 80 h.p. monoplane with Lieut. Osmond, R.N. Jullerot giving monoplane tuition to Capt. Barnby, Lieut. Pascanu, and Mr. Delaplane. Pixton in sociable monoplane with Mr. Delaplane, and Busteed giving biplane tuition to Lieut. Osmond, R.N., pupil in pilot's seat.

Pixton biplane tuition to Lieut. Orton on Tuesday, Capt. Barnby and Air-Mechanic Pratt twice. Capt. Popovici two excellent solos at 500 ft. Mr. Garnett also good solo at 200 ft., both landing well. Pizey gave biplane tuition to Capt. Barnby, Lieut. Pascanu and Mr. Delaplane, and on monoplane to Lieut. Berionade, Lieut. Pascanu and Mr. Delaplane. First solos in fine style by Lieuts. Osmond and Miley on biplanes, both flying and landing excellently. Busteed and Pizey up to test conditions, former then giving to Lieut. Pascanu (twice) and Lieut. Beroinade. Pizey biplane trial, then with Air-Mechanic Pratt. Pixton taking Lieut. Barnby and Lieut. Orton. Jullerot on Bristol sociable monoplane with Mr. Delaplane. First rate monoplane solos by Mr. Garnett and Capt. Popovici. Whilst Lieut. Miley, R.N., and Lieut. Osmond, R.N., good biplane solos. Capt. Barnby, and Air-Mechanic Pratt, biplane solos in excellent style.

Pizey with Lieut. Pascanu in side-by-side monoplane. Pixton up for long flight with Lieut. Orton, and later with Air-Mechanic Pratt. Dull evening, fair wind. Pizey trial, then up with Lieut. Orton for two trips, and Capt. Barnby one flight. Busteed up for monoplane tuition with Capt. Popovici, Lieut. Pascanu and Mr. Delaplane. Weather too bad for further work.

On Thursday, Busteed out early with Lieut. Beroinade, Lieut. Pascanu, and Mr. Delaplane for monoplane tuition, later taking Lieut. Orton for a couple of biplane trips. Good biplane solos by Capt. Barnby and Lieuts. Miley, R.N., and Osmond, R.N. Too windy in the evening for further flying.

Mr. Garnett and Capt. Popovici each made good monoplane solos first thing on Friday, in spite of rather bumpy conditions. Pizey out later for test, and later Capt. Barnby and Lieut. Miley, R.N., each ascended for two capital solos, while Lieut. Osmond, R.N., was up for one. Pizey was busy giving monoplane tuition to Lieuts. Beroinade and Pascanu and Mr. Delaplane.

Pixton was first up on Saturday, with Mr. Tower as passenger. Busteed with Mr. Delaplane and Lieuts. Beroinade and Pascanu for monoplane tuition. Capt. Popovici and Mr. Garnett two good monoplane solos each, whilst Capt. Barnby and Lieut. Miley, R.N., and Lieut. Osmond, R.N., two trips each on biplane. Mr. Delaplane, Lieuts. Beroinade and Pascanu all made their first monoplane solos in fine style, landing well. Busteed wound up the day's flying by taking a lady passenger for a flight in a sociable monoplane.

**Royal Flying Corps. 3rd and 4th Squadrons.**—On Tuesday of last week, the R.F.C. was busy removing from Larkhill to their new quarters at Mile Ball. Lieut. Carmichael was out twice on H. Farman 284, with Air-Mechanic Aylen and Capt. Foresight, R.A.M.C. Afterwards, Lieut. Allen was flying the biplane, and Capt. Fox was up for 70 minutes on the I.C.S. Blériot 219. Major Brooke-Popham was out on the Avro 289, and Lieut. Wadham and Lieut. Porter were also flying. A splendid night flight of 18 minutes' duration was put up by Lieut. Carmichael on H. Farman 284, a fine landing being made at 10.30.

Major Brooke-Popham made two flights on Avro 289 on Wednesday, and Lieut. Cholmondeley, on the M. Farman 274, was busy taking up officers and mechanics. Lieut. Conran made three good flights on the Avro 288, and Lieut. Wadham made five on Avro 289. Two new machines arrived from Farnborough—one a BE 201, piloted by Major Raleigh, and the other an M. Farman, with Capt. Reynolds in charge. They flew at a height of 2,500 ft., and reported very misty weather; the journey took 1 hr. 20 mins.

Thursday, Lieut. Gould arrived from Ramsbury on M. Farman 307. Lieut. Conran was out on the Avro 288 and got to a height of 7,000 ft. during a trip of 1 hr. 10 mins. Lieut. Cholmondeley was also up for an hour on H. Farman 274, and went up to 7,000 ft. Lieut. Wadham made two scouting trips on Avro 289.

Some bomb-dropping was carried out on Friday. Lieut. Conran, on the Avro 288, made four good flights at good heights. Lieut. Wadham, on Avro 289, put up five flights. Lieuts. Porter and Roupell were out on H. Farman 286. Lieuts. Wadham, Nevill and Cholmondeley, and Air-Mechanic Powell did good work on H. Farman 274. Capt. Board was out on H. Farman 305, and Lieut. Gould on M. Farman 307. Three times Lieut. Cholmondeley went up on H. Farman 274 on Saturday morning, and Lieut. Porter went up twice on Avro 289.

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# THE CALDERARA HYDRO-AEROPLANE.

AN interesting function, both socially and scientifically, took place at Lord Blyth's residence, in Portland Place, on Tuesday afternoon last week, when the First Lord of the Admiralty, the Italian Ambassador, the Lord Mayor of London, and many other distinguished guests were invited to meet Lieut. M. Calderara, of the Royal Italian Navy, and to hear a short lecture by Mr. F. Fabbricotti, on the aeroplane that Mr. Calderara built for the Italian navy. The lecture was accompanied by a series of uncommonly interesting kinematograph views, showing the machine in flight.

Our readers are already familiar with the general outlines of the Calderara machine. They will remember that it is an exceedingly large hydro-monoplane, probably, in fact, the largest monoplane in existence. Its other outstanding peculiarity is the raft-like base on which it rides the water, and which permits the mechanics to scramble about the lower part of the machine in comparative safety while it is at sea. Some of the pictures showed the mechanics moving about while the aeroplane was navigating the water, and Lieut. Calderara has actually had mechanics climb from the floats to the body of the machine whilst he was in full flight.

It is always interesting, and frequently instructive, to learn something about the work of other nations in the realm of aviation, and particularly is the opportunity not to be missed when one can hear first hand views on the subject. Moreover, it must further be admitted that the views of any of Wilbur Wright's own pupils on the subject of aeroplane construction, no less than the views of a naval officer on the requirements of a hydro-aeroplane ought to be worthy of consideration.

Mr. Fabricotti made it very clear that Lieut. Calderara did not wish this particular machine to be regarded as an expression of his fixed and inflexible idea of the best type for marine purposes. On the contrary, he had been called upon to design for a specific purpose, and that specific purpose he had fulfilled to the satisfaction of the Italian Navy.

The reason why he chose to build his machine as a monoplane was mainly in order that the wing-tips might be as far removed from the water as possible. The reason why this feature assumed a particular importance on this occasion, was because the wing tips are the most easily damaged of any part of the machine, and the Italian authorities had made a very strong point of securing a hydro-aeroplane that should be as little liable to accidental damage of this character as possible. Indeed, they particularised their views in the matter by limiting the allowance for repairs during the trials to the sum of £20. The size of the machine was, of course, a natural consequence of the weight to be carried in flight, which is always heavier in the case of a hydro-aeroplane.

A portion of the film that was of especial interest was that showing the action of the floats in the water. The floats employed on this machine are those now being built in this country by the Avion Float Co., and the pictures in question were taken at close range with the camera on board the machine. It is, of course, impossible to describe them in detail, but they are certainly of sufficient interest to be seen by those who are directly concerned with hydro-aeroplane development, and we have no doubt that arrangements for seeing the film could be made with Mr. Fabbricotti, who may be addressed at the works of the Avion Float Co., 17, Wharf Road, City Road, London, N.

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**The N.A.D.A. in Sussex.**

AT a meeting held at the Hove Town Hall on Friday last week, the inauguration of a Sussex branch of the National Aerial Defence Association was decided upon. A sympathetic message was read from the Lord Mayor of London, and among the speakers were Mr. Lionel de Rothschild, M.P., and Mr. P. J. Hannon, the hon. sec. of the Navy League and the N.A.D.A.

FLIGHT

# MIDSUMMER MEETING, HENDON.

GLORIOUS weather and a large attendance contributed towards the success of the Midsummer Meeting at Hendon last Saturday. The feature of the day was in Sydney Pickles successfully passing the test for his superior *brevet*. At about noon he left for Brighton on the new British-built (Hewlett and Blondeau) Caudron biplane, which is fitted with a 45 h.p. Anzani engine. After a stay at Brighton for lunch, he started for Hendon at 3.10 p.m., arriving at the latter place at 4.27 p.m. He was sighted at the aerodrome whilst the first heat of the speed handicap was in progress; he was up about 3,400 ft., and made a very impressive descent, starting with a spiral and finishing with a steep *vol plané*. Not satisfied with his splendid flight, Sydney Pickles entered for the second heat of the speed handicap, which started shortly after his arrival, showing that neither pilot nor machine were a bit tired! Before the start of the above-mentioned speed handicap several exhibition flights were made by Pierre Verrier, Louis Noel, H. M. Brock, and G. L. Temple. Brock was flying the 35 h.p. Anzani-Deperdussin monoplane in fine form, making us "hold our breath" several times. Only two lined up for the first heat (six laps) of the speed handicap, Louis Noel on the 50 h.p. Grahame-White biplane, and G. L. Temple on his 35 h.p. Caudron biplane. The latter had to retire at the start owing to a broken propeller, so it was a "fly over" for Noel, who finished the course by himself in 13 mins. 55 secs. Three started in the second heat (also six laps) as follows: H. M. Brock on the 35 h.p. Deperdussin monoplane (1 min. 11 secs. start); Sydney Pickles on the 45 h.p. Caudron biplane (45 secs. start); and Pierre Verrier on the 70 h.p. Maurice Farman biplane (scratch). The finish to this heat was very close, Sydney Pickles, by clever banking at the pylons, securing first place. Brock came in second, 21 secs. behind, followed by Noel 12 secs. after. The final heat was flown over eight laps, and this time Sydney Pickles was put at scratch, giving H. M. Brock, on his 35 h.p. Dep., 1 min. 20 secs. start, and L. Noel 5 mins. 25 secs. start, which, although rather a compliment to the capabilities of man and machine, proved to be too much for them, for in spite of his really very fine flying Pickles was unable to gain first place, which Brock kept all the time. However, it was a very fine race, and both pilots put up a splendid fight. Noel had to retire owing to engine trouble, so did not have a chance to show what he could do. During the afternoon Verrier took up in the Maurice Farman biplane two distinguished passengers, these were the Chief and Rani (wife) of Ichal Karanje. They both enjoyed their experience in a way that we Westerners, used, as we are, to things mechanical, could hardly appreciate. The times of the final heat (8 laps) of the Grand Speed Handicap were :—

| | Start. | Handicap Time. |
|---|---|---|
| | m. s. | m. s. |
| 1. H. M. Brock (35 h.p. Anzani-Deperdussin monoplane) ... ... ... | 1 20 | 17 36 |
| 2. Sydney Pickles (45 h.p. Anzani-Caudron biplane) ... ... ... ... | scratch | 17 48 |
| 3. Louis Noel (50 h.p. Gnome-Grahame-White biplane) ... ... ... | 5 25 | retired |

Considering that Ascot Sunday sees all and sundry on or by the River, there was a very good attendance at Hendon on the afternoon in question. Unfortunately, for various reasons, there were only three machines out, so that the flying was by no means up to the usual standard. As usual, Pierre Verrier was hard at work taking up passengers on the Aircraft Company's Maurice Farman biplane. Amongst these passengers were several of the foreign riders from the International Horse Show at Olympia. Earlier in the day Claude Grahame-White flew the 50 h.p. G.-W. 'bus over to Taplow, and Louis Noel flew it back in the afternoon. E. Cheeseman and Marcus D. Manton both gave exhibition flights on the same machine during the afternoon. H. M. Brock also came out on the 35 h.p. Deperdussin monoplane. Although nice and fine, this Sunday was not altogether perfect for flying, especially for cross-country work, owing to *remous* caused by the heat. In fact, Noel, in flying from Taplow, said he had a terrible time of it.

## HENDON NOTES.

Commemorative of the visit to this country of M. Poincaré, President of the French Republic, to day's (Saturday) meeting at Hendon has been christened "Entente Cordiale" Day. The event of the day will be a grand speed handicap for the "Entente Cordiale Cup" presented by Mr. P. Teofani. Another event will be an altitude contest, for which a prize has been presented by Miss Ruth Bryde.

I mentioned in these notes some little time back that the long contemplated club at the Hendon Aerodrome was going forward. The London Aerodrome Club, Ltd., has now been registered, with a capital of £20,000 in £1 shares. It should not be long, therefore, before we shall see this concern in full swing, and judging from what I have already seen of the prospective attractions for members, designs of club buildings, &c., I think I can prophesy a good thing.

A new tenant will shortly be seen at work up at Hendon, for when visiting Eastchurch the other day Lieut. Dunne told me that the Blair Atholl Aeroplane Syndicate, Ltd., who are the manufacturers of the Dunne patent safety aeroplanes, are about to take over some hangars at the aerodrome. Both the Dunne monoplane and biplane have been fully described in past issues of this journal, so all it is necessary for me to say here in reference to these machines is that their outstanding features consist of the absence of any tail or elevator, and the peculiar formation of the planes. The latter not only sweep rearwards like an arrow-head, but the wing tips are given a pronounced negative angle of incidence and curve downwards. Some of these machines have recently been flying in France, and successfully, too, so much so that I believe the French Government have ordered some of the latest type biplanes, so pleased were they with the way in which those out there pair out. The particular type in question is a great improvement on the former biplane, although it retains nearly all the original characteristics. To describe it briefly, the top plane, which is staggered forward, is similar to the main plane of the monoplane described in FLIGHT for June 24th, 1911. The underplane is also of < plan-form, but has a different curvature, having only a slight negative angle of incidence at the tips. A long Henry Farman type *nacelle* is fitted, and the usual unbreakable Dunne landing chassis forms another feature of this interesting machine. I hope that a full detailed description of one of these biplanes will be given in FLIGHT very shortly.

Those who have followed the model aeroplane side of aviation will be familiar with the name of C. R. Fairey, the designer of the successful model bearing his name. In connection with my visit to the Blair Atholl works at Eastchurch, I was pleased to meet Mr. Fairey again, this time in his capacity of manager to this firm, he having some little time back joined with Lieut. Dunne in the work of pushing forward the success of the Dunne aeroplanes. He is a live man, and not only keenly enthusiastic about the machines under his charge, but has a thorough knowledge of his subject. Here's luck to the Dunne machine and those associated with it.

"VEE JAY."

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### An Echo of Milan Meeting.

AN extraordinary decision in an extraordinary case is the only comment which one can make on the reserved decision given by the Paris courts, condemning Capt. Dickson to pay £200 damages to Thomas and £400 to the liquidator of the Antoinette Co., in respect of the accident which occurred at the Milan meeting at the end of September, 1910. It will be remembered that Thomas, in coming down, crashed on to Capt. Dickson's Farman, and in the smash both pilots were seriously injured, Capt. Dickson so seriously that his life was despaired of for some time. The French courts have held that as Capt. Dickson was only giving an exhibition flight at the time while Thomas was flying in the duration competition, the former was responsible. It seems strange, however, that an action against a British subject for damages in an accident which occurred in Italy should be heard in France. International law with a vengeance!

### The H.P. Monoplane at Mansfield, &c.

DURING last week the Handley Page monoplane was at Mansfield and Leicester.

On Monday week, between eight and nine in the evening, Whitehouse went out for a trial flight for about 45 mins. A thick mist rising he was unable to find the Ground on returning, and flying over it landed about three miles north of Mansfield. On Thursday evening he flew back to Mansfield.

At 7 p.m. on Friday, Whitehouse started for Lincoln, and alighted at Doddington, five miles outside Lincoln, a bad sparking plug causing one of the cylinders to miss.

Sunday evening saw him leaving Doddington, and flying round Lincoln at 2,000 ft. he made a splendid landing in the Exhibition Ground at Nettleham Road. Later in the evening he made another flight.

### Another Borel for the Royal Flying Corps.

ON Tuesday, another hydro-aeroplane of the Borel make was delivered at the Isle of Grain Naval station, for the use of the Naval wing of the Royal Flying Corps.

# FOREIGN AVIATION NEWS.

### Prevost Improves the Speed Record.

THERE is a deal of speculation in France at the present time as to who will first succeed in attaining a speed of 200 kiloms. an hour. On the 18th inst. Prevost was practising at Rheims over an out-and-home course of 3·5 kiloms., and is stated to have attained a speed of 190 kiloms. an hour. He was using a monocoque Deperdussin monoplane, fitted with a 140 h.p. Gnome.

### Cavelier's Record for Michelin Cup.

CONTINUING his flight for the International Michelin Prize, Marcel Cavelier, on the 18th inst., made one more circuit of the Etampes-Gidy course and had covered 64 kiloms. of a second round when he had to stop. On the two previous days he had made 17 rounds of the 111 kiloms. course so that his record for the cup was 18 rounds or 1,998 kiloms., uncompleted circuits being ignored. The total distance flown by the Deperdussin-Rhone was 2,062 kiloms.

### A Belgian Height Record.

AT Ghent, on the 18th inst., Crombez on a Deperdussin monocoque, with 80 h.p. Gnome motor, beat the Belgian height record, 2,800 metres, which was standing to the credit of Tyck. During a trip of 45 mins. Crombez got up to a height of 3,800 metres and came down in seven minutes.

### Height Record with Three Passengers.

AT Johannisthal on Monday, Thelen on a military biplane succeeded in bettering Chevillard's record of 1,350 metres for pilot and three passengers. Accompanied by Lieut. Muenster and carrying ballast to represent two other passengers—a total useful load of 260 kilogs., Thelen took the machine up to 2,150 metres in 45 minutes.

### A New Russian Height Record.

AT Sebastopol on Saturday, Capt. Semitane on an 80 h.p. two-seater Morane-Saulnier, with a passenger, beat the Russian height record made a few days ago by Gaber Vlinsky. He climbed 3,000 metres in 28 mins., and returned to the ground by a *vol plané* in 4 mins.

### An American Record Passed.

THE Aero Club of America has accepted the non-stop cross-country record of Lieut. de W. Milling, made on March 28th last, from Texas City to San Antonio, as 220 miles in 4 hrs. 22 mins., the trip being made with a passenger.

### A High Flying Prince.

PRINCE GEORGE OF BAVARIA was taken by Hirth for a trip on a Rumpler-Taube monoplane on the 19th inst., and for about an hour was flying over and around Munich at a height of 2,000 metres.

### An Honour for Brindejonc.

IT was announced at St. Petersburg on Saturday last that the Czar had conferred the order of St. Anne (3rd class) on Brindejonc des Moulinais in recognition of his splendid flight from Paris to St. Petersburg. Brindejonc started on the return journey to Paris on Monday evening, when he flew the 30 miles to Gatchina.

### Long Flights on Farmans.

FROM Etampes, on the 18th inst., Van Steyn, Jun., on a H. Farman, made a triangular test for a superior *brevet* over the course to Vendome, Chateaudun and back. The same day Lieut. Lussigny, on a M. Farman, arrived at Etampes from Mailly Camp, doing the trip in 2 hours 20 mins., and Lieut. Collard went from Buc to Etampes and then on to Melun before returning to Buc.

### Honours for French Aviators.

THE French Minister of War is considering the formation of a separate section of the Legion of Honour for aviators, consisting of 1 commander, 4 officers and 20 chevaliers with full pay, and 2 officers and 20 chevaliers without pay.

### Mme. Blériot Enjoys a Trip.

ON a tandem military monoplane, M. Louis Blériot, on the 18th inst., took his wife for an excursion over Buc and St. Cyr.

### Testing the New Borel.

ON the 18th inst., at Buc, Daucourt was testing the latest Borel monoplane, illustrated in our last issue, and among other tests made one flight of an hour's duration, being accompanied by a passenger.

### A Doutre Superior Pilot.

AT Corbeaulieu on the 18th inst., Capt. Chanson completed his tests for a military *brevet*, using one of the Doutre machines fitted with stabiliser, and flying over the course Douai–Compiegne–Amiens–Douai.

### Good Work at Bathiat School.

THREE soldiers, Robinet, Chausse and Berlot were flying *en escadrille* on Bathiat-Sanchez machines over Rheims, Epernay and Chalons on the 18th inst. Lannier made a flight of an hour's duration and Labarre manœuvred above the dirigible "Selle de Beauchamp."

### Buc to Chalons and Back on a Borel.

LIEUT. DE VERGNETTE, on his Borel monoplane, on the 19th inst., went from Buc to Chalons Camp, and in the afternoon he returned to Buc, keeping at an average altitude of 1,200 metres.

### A Promising Farman Pupil.

AFTER carrying out the necessary tests to qualify for his pilot's certificate at Buc on the 19th inst., Anger, one of the M. Farman pupils, made a flight of over a hour's duration, during which he flew over Paris at a height of 1,400 metres.

### A Good Morning's Work.

ON his Gnome-engined H. Farman, Capt. Bertin, who has been undergoing a course of instruction at the Farman school at Etampes, made two tests for his superior *brevet* on the morning of the 16th inst., going from Etampes to Mailly Camp and back, a round trip of 350 kiloms.

### Some Long Reconnaissances.

LAST week the military aviation station at Toul was inspected by General Goetschy and Col. Bouttieaux, who saw some fine flying by the escadrille No. 1, which is made up of eight 80 h.p. H. Farmans. On the 16th, Sergts. Guitou and Corbeil each made a reconnoitring flight of 2½ hours over Toul, St. Dizier, Sandrut and Ligny en Barois, returning of course to Toul. The next day Sergts. Guiton and Berlioux each made a trip of an hour over Toul, Frouart, and Morlache, while on the 18th, Lieut. Prat, with Guitou, Berlioux and Corbeil carried out a combined scouting trip of between 1¼ and 1½ hours' duration.

### Testing New Farmans.

DURING the week-end, Henry Farman, and also his brother Maurice, were busy as usual testing new machines. Henry Farman, among other things, carried out trials over the Trou Sale with one of the latest Farman hydro-aeroplanes. Later he and Fischer were carrying out some comparative speed tests with one of the ordinary type 80 h.p. biplanes, and one of the latest models, also fitted with an 80 h.p. motor.

### Testing a Modified Blériot.

IN order to be present at Buc at the trials of a modified Blériot monoplane, Lieut. Gaubert, on the 19th inst., flew on his Blériot from Belfort to Buc by way of Troyes, Rheims and Compiegne. The next morning, Capt. Faure and Lieut. Gouin flew over from St. Cyr, and with Capt. Destouches saw the machine put through its paces by Pegoud and Domenjoz. On Sunday, Lieut. Gaubert made two 1 hour flights on a Gnome-Blériot.

### Champel Visits Gisors.

ON his big biplane, with 100 h.p. Anzani motor, Champel, on the 21st inst., left Juvisy, and after making a landing at Chars to get a rest from a blinding rainstorm he arrived safely at Gisors, where he had an engagement to give exhibitions with Guillaux and Daucourt.

### Lieut. Varcin Continues South.

CONTINUING his fine flight to the South of France, of which particulars as to the Paris-Bordeaux stage were given in our last issue, Lieut. Varcin, on Saturday, started from Bordeaux at 11.15 a.m., and at 1.45 p.m. he made a splendid landing at Pau.

### Long Trips on Nieuports.

LAST Saturday, Sergeant Baumens on his Nieuport monoplane started from Villacoublay, and flying by way of Orleans and Chartres was back at Villacoublay, having covered the triangular course in 2 hrs. 35 mins. Meanwhile Sergeant Picquet on a 100 h.p. machine made a flight lasting 1¼ hours at Villacoublay.

### Another Aviatress Qualifies.

ON the 19th inst., at Buc, Mme. de Plagino, who, it may be remarked, accompanied Perreyon in his recent successful attack on the passenger height record, qualified in excellent style for a pilot's certificate at the Blériot school.

### To View Grand Prix Circuit from Above.

IN his capacity as a member of the committee of the Automobile Club of France, M. Etienne Giraud had to make this week an inspection of the roads of the Picardie circuit over which the Grand Prix motor car race is to be run on July 12th, and so on Tuesday he mounted his Blériot monoplane at Buc and flew over with his mechanic to Amiens.

### A Fatal Accident at Etampes.

ONE of the military pupils, private Debever, who was training in order to secure a superior *brevet* at the Etampes aerodrome met with a fatal accident on the 18th inst. He was flying a military biplane at a height of about 500 metres above the ground when he appeared to lose control of it and the machine with the engine still running commenced to dive steeply. When the machine was about 15 metres from the ground the unfortunate pilot was thrown out and was killed on the spot.

### A Promising Zodiac Pupil.

AT St. Cyr, on Saturday, Roques, a Comite Nationale pupil, completed his period of instruction at the Zodiac school, and made a flight of an hour and a half over the district.

### Awards at the Tamise Meeting.

AT the request of the F.A.I., the Belgian Aero Club has reconsidered the awards in the competition for hydro-aeroplanes at Tamise last year, and has given first place to Benoist on a Sanchez-Beza, with 163 points, Chemet (Borel) being placed second with 156 points, and Renaux (M. Farman) third, with 152 points. The remaining awards were : 4, Beaumont (Leveque) ; 5, Molla (Rep) ; 6, Weymann (Nieuport) ; 7, Lanser (Lanser) ; 8, Barra (Paulhan-Curtiss) ; 9, Gobe (Nieuport) ; 10, Train (Train) ; 11, Busson (de Brouckere).

### The Aerial Manœuvres at Cologne.

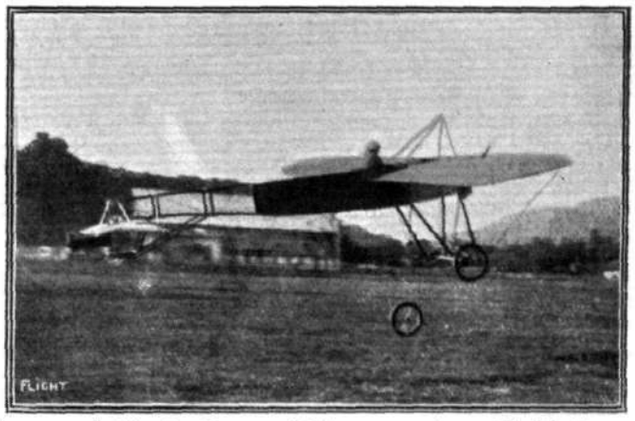
THE aerial manœuvres carried out at Cologne on the 17th inst., resulted, not unexpectedly, in the defeat of the balloonists. Sixteen balloons, four aeroplanes, and fifteen motor cars took part. The aviators easily sighted the various balloons and identified them. Seven of the balloons were captured by the motorists, four managed to escape from their pursuers while the remaining five drifted across the frontier into Holland, where the motor cars were unable to follow.

### A Double Fatality at Johannisthal.

WHILE Kraftel and his mechanic Gerbitz were making an attempt to win a prize offered for a flight of two hours at Johannisthal, their Baumann-Freytag biplane fell from a height of 150 ft., and both pilot and passenger were killed on the spot. Apparently something went wrong with the tail of the machine.

### Firing at Balloons in Austria.

THE French Aero Club has drawn the attention of the Minister of Foreign affairs to the fact that the balloon in which M. Rumpelmeyer and a lady passenger beat the world's record for distance was fired at by Austrian troops near the Russian frontier.



**A remarkable incident which occurred to Taddeoli on June 6th when flying from Berne to Bienne in Switzerland. One of the chassis wheels came off without his knowing anything about it, but Bider, who was at the aerodrome, at once started after him on his Blériot, and by means of energetic dumb show managed to apprise Taddeoli of his danger, so that Taddeoli was able to land so carefully that no further damage of any sort occurred.—** *Suisse Sportive.*

An examination of the envelope shows that there are 28 holes in it, so that 14 bullets found their mark.

### Despatch Carrying in Russia.

CARRYING official documents, Lieuts. Ouchakoff and Effinoft, on their Nieuport monoplanes, on the 3rd inst., made a trip from St. Petersburg to Gatchina and afterwards returned to the Russian capital.

### Fatalities in the U.S.A.

MR. ANDREW DREW, one of the best-known pilots in America, was killed while making a trial flight at Lima, Ohio, on the 13th inst., in a fall from a height of 200 ft. On the 20th inst., while Lieut. J. Towers was piloting one of the waterplanes belonging to the U.S. Navy, over Chesapeake Bay, his companion, Ensign Billingsley, was thrown out during a sudden dive from a height of 400 ft. Lieut. Tower remained in the machine, and fell with it into the bay, where he was picked up seriously injured.

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# THE VIENNA MEETING.

IN our last issue we referred to the fine performances made by Perreyon and Illner on the opening days of the Vienna meeting, and the height record made on Tuesday week by Illner, with two passengers, was officially recorded as 5,011 metres. Perreyon, however, won the climbing competition, going up 1,000 metres in 2 mins., while Audemars was second in 2 mins. 5 secs. Each alternate day was a rest day, and so the next flying was on the 19th inst., when Illner won the height prize, going up to 4,170 metres on the 120 h.p. Austro-Daimler-Etrich, while Sablatnig, on a Union Arrowplane, took up four passengers to 1,040 metres. Perreyon, on his Blériot, climbed 2,000 metres in 2 min. 50 secs., and won the prize offered by the Minister of War. Bielovucic won the duration contest on his Hanriot, with 3 hrs. 25 mins. 3 secs., Bathiat on the Bathiat being second with 2 h. 24 m. 32 s. Chevilliard demonstrated his speciality, the *chute de cote*, and Mme. Pallier on her Astra and Mdlle. Steinschneider each made long flights. No flying was possible on Saturday on account of the bad weather, and on Sunday there were two bad accidents. In one, Stanger, who was flying a Lohner machine, was in collision with Molla, who was flying a Rep, and not only were both machines smashed, but the pilots were seriously injured, as also was the passenger with Stanger. Soon afterwards Mdlle. Steinschneider had a smash, but she escaped unharmed. A landing competition was won by Garros on his Morane, with Chevilliard a good second on the Farman.

The events postponed from Saturday were to have been held on Monday, and a large crowd gathered, while the Emperor Francis Joseph was also present. A cloud was thrown over the proceedings, however, when it became known that Lieut. Nepallek, who was the passenger with Stanger on the previons day when his machine was wrecked, had succumbed to his injuries. The race from Aspern to Neustadt and back was won by Garros in 40 mins. 34 secs., Illner, with two passengers, being second in 48 mins. 10 secs. Mme. Pallier won the height event for ladies, and Bregi, Tetard and Chevilliard each gave exhibitions in their own special styles.

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### Mr. Hucks in Shropshire.

ALTHOUGH the rough weather that was experienced all over the country during the middle part of last week did not make the conditions any too good for exhibition work, Mr. Hucks did not disappoint the people of Market Drayton and Ludlow. He was at the former place on Wednesday of last week, and gave one of his usual exhibitions, and on the following day he was booked to fly at Ludlow. It was originally intended to send the Blériot machine by train, but for some reason the special truck was sent away without it. There was therefore nothing to be done but to fly it over. A 30-mile wind was blowing, and the country is none too easy ; but about 4 p.m. Mr. Hucks got away on his 40-mile trip. A few minutes after the telegram arrived at Ludlow to say Mr. Hucks had started he appeared out of the clouds, and was loudly cheered by the crowd, who had waited very patiently.

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### Nardini's Week-End Flying.

ON Saturday last Nardini took his Deperdussin monoplane down to the sylvan suburb of Surbiton, there to delight the local enthusiasts by giving a demonstration from an improvised aerodrome that it might have taxed the ability of less skilful pilots either to leave or to alight in. It was not an ideal spot for flying, for the field was narrow and none too long. It was bounded for the most part by high trees, had a haystack and a pole in one corner, and a full set of telegraph wires running diagonally across the other. These latter were carefully marked out by a string of bunting comprising, so far as the eye could see, the flags of all nations save that of Italy ; but of this shortcoming in the scheme of decorations, however, Nardini was probably unaware. He made his flights successfully and skilfully, and the spectators were duly appreciative of what they saw.

# THE COMPARISON OF MONOPLANES AND BIPLANES, WITH SPECIAL REFERENCE TO THE STRESSES IN EACH TYPE.

By F. HANDLEY PAGE, A.F.Ae.S.

1. **General Outline.**—During the past year, the question as to the relative advantages of monoplane and biplane types has been brought very much to the fore owing to the unfortunate accidents that have occurred—the accidents in this country being all on the monoplane type of machine. In the present paper, a comparison has been made of the stresses set up in the various parts of the two types, so that conclusions might be drawn as to the limits, if any, between which each type was most suitable. A further note is included, giving a short comparison as to their respective aerodynamical qualities, so that the whole survey might be as complete as possible.

The biplane type has been divided into two classes dependent on the type of bracing employed for staying the main cellules of the planes.

Fig. 1 is a diagrammatic representation of the case in which the ordinary cross bracing of each cellule is used.

Fig. 2, of the case where the main cables have their anchoring in the *fuselage*.

The first type is more applicable to biplanes of small span than the second.

The monoplane type has similarly been divided into two classes, also depending on the method of present use. Fig. 3 shows what I have termed the ordinary bracing as used on the Blériot, Deperdussin, &c.; Fig. 4 the bracing employed when a king-post is used, as in the old Antoinette machine.

2. **Method of Analysis.**—In any ordinary aeroplane structure of present-day type the stresses that are met with are either simple compression or tension as in the struts or stay wires respectively of the machine, or there may be a compound stress as in the case of the main spars of the plane where there is combined compression and bending. This latter case, which is the equivalent of a strut with a lateral loading, has been very ably dealt with by Professors Perry and Morley.* It is here only necessary to give the results obtained, which, in the approximate form suggested by Professor Perry, are as follows:—

The maximum bending moment due to the compressive force in the top spar $= M_0 = M \times \frac{P_e}{P_e - P}$ (1)

where M = bending moment due to air pressures and fixing moment.

$P_e$ = Euler's limiting value for ideal struts, depending on

I = the moment of inertia of the strut cross-section about an axis through its centroid perpendicular to the plane of flexure.

E = Young's modulus.

P = The compressive force in lbs. action on the spar ends.

A = Area of cross-section in square inches.

The maximum intensity of bending stresses for a spar of symmetrical section is $P_b = \frac{M_0 d}{2I}$ (2)

where $M_0$ and I have the same values as before and $d$ = depth of spar in inches.

Hence the maximum intensity of compressive stresses in the top spar is $f_c = \frac{M_0 d}{I} + \frac{P}{A}$ (3)

The maximum intensity of tensile stress in the lower spars of a

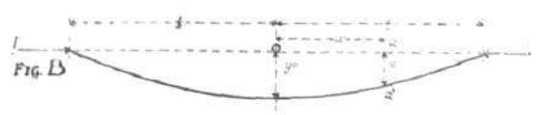


FIG. B.

biplane will be represented by the same formulæ, but in this case the part of formula (1) which deals with the force reads $\frac{P_e}{P_e + P}$

The diagram in Fig. B gives the meaning of the various factors in the equations.

It is now only necessary to consider particular cases, and for each one to determine:—

(1) The loading on each part of the plane, including the simple compression and tension stresses in struts and stay wires.

(2) The shearing force.

(3) The bending moment.

(4) The maximum intensity of stresses for any portion of the plane spar.

* J. A. Morley, *Philosophical Magazine*, June, 1908; Prof. J. Perry, *Philosophical Magazine*, March, 1892.

The above reasoning would only apply to machines similar to the Breguet, in which practically all the load is taken on one wing spar—in the case of this machine a round steel tube. In other types where there is both a front and a back spar—each carrying a large proportion of the load—the amount carried by each must be calculated so that the stresses in each can be accurately found. This is a simple matter if the movement of the centre of pressure is known for different angles of inclination. In the diagrams, the force shown is the total amount for the two spars.

The stresses set up in the ribs of the machine have been dealt with separately after the general consideration of the plane spar stresses.

3. **Examples of Machines Considered.**—In order to make the presentation of the subject as clear as possible three cases have been calculated for both monoplane and biplane. In each an allowance of 5 lbs. average lift per sq. ft. of surface of the planes has been assumed, so that for both monoplane and biplane practically the same range of speed variation and climbing power is obtained for both types. This is not strictly accurate, as will be explained later when the modifications necessary, owing to this assumption, are discussed.

The central body of the machine has in both cases been excluded, and the span of the machine taken to be nearly the span of the planes themselves. This assumption does not materially affect the result.

The three cases calculated are as follows:—

(1) Machine with 150 sq. ft. area.

(2) Machine with 275 sq. ft. area.

(3) Machine with 400 sq. ft. area.

The corresponding lifting capacity of each type is on the 5 lb. per sq. ft. lift assumption respectively:—

(1) 750 lbs.

(2) 1,375 lbs.

(3) 2,000 lbs.

The dimensions of each type are set forth in the following table:—

4. **Sizes of Machines considered.**

| Type. | Area. | Span. Top plane. | Span. Lower plane. | Chord. |
|---|---|---|---|---|
| | sq. ft. | ft. in. | ft. in. | ft. in. |
| Monoplane ... | 150 | 30 0 | — | 5 0 |
| Biplane ... | 150 | 25 0 | 18 0 | 3 6 |
| Monoplane ... | 275 | 41 0 | — | 6 9 |
| Biplane ... | 275 | 33 9 | 24 3 | 4 9 |
| Monoplane ... | 400 | 47 0 | — | 8 6 |
| Biplane ... | 400 | 40 9 | 29 3 | 5 9 |

There are twelve diagrams for the six machines, shown in Figs. 1–12. Each biplane has been calculated for both cellule and monoplane bracing, and each monoplane for the ordinary and for king-post bracing. This division has been already referred to.

5. **Method of Comparing the Results.**—Comparison may be readily effected between the forces of simple compression or tension that exist in any members of either size of machine. When the case of the combined stress is considered there is a difference. The amount of increased compression or tension due to the lateral load depends on the section of the spars used. A small assumption must be made at this point to present the facts clearly. A spar of constant thickness of flange and web, but of varying depth, has been used in each case. The various depths of spar that are required for the different cases enable an idea to be formed as to the relative limits and advantages of the various sizes from the point of structural considerations.

For a machine of given area, and in this paper, therefore, of given load, the vertical force will be the same for both monoplane or biplane, although the dispositions thereof may be somewhat varied. The figures for these have not been included in the diagrams. The forces existing in the stay wires or struts of a machine due to the vertical force are much smaller than those in the longitudinal members. The limits, therefore, of a given type are rather to be found in the sizes of the horizontal spars than in the vertical ones. On each diagram the following figures are given:—

(*a*) The loading per foot run.

(*b*) The tension or compression in each horizontal member due to the action of the stay wires.

(*c*) The intensity of stress in the spar cross section due to:

(1) The simple compression in the spar. This is denoted in the diagram by the letter C.

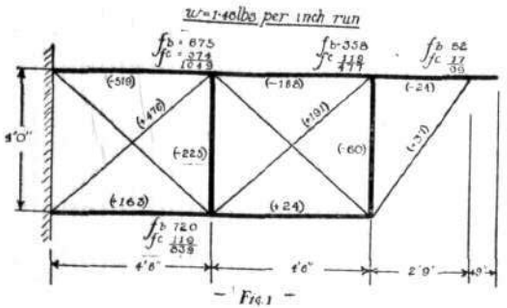



FIG. 1

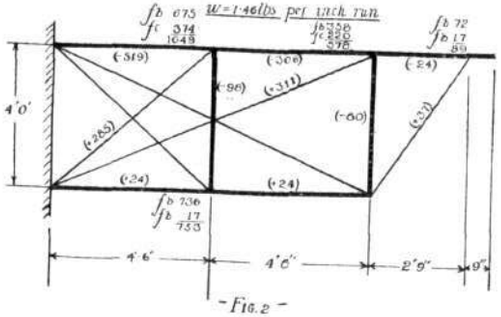



FIG. 2

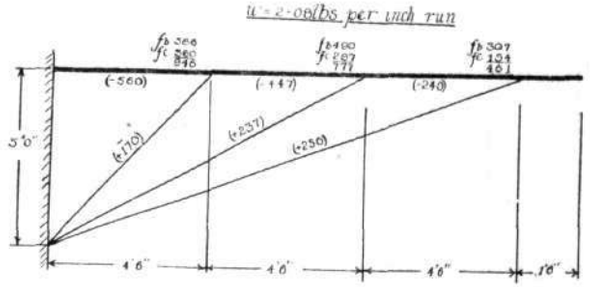



FIG. 3

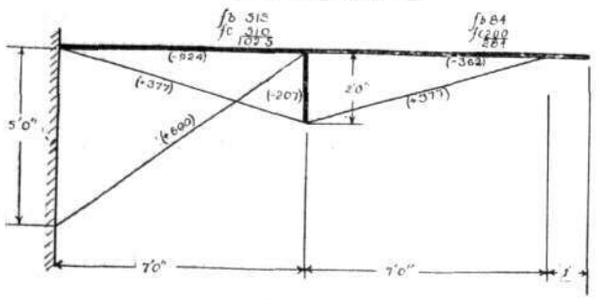



FIG. 4

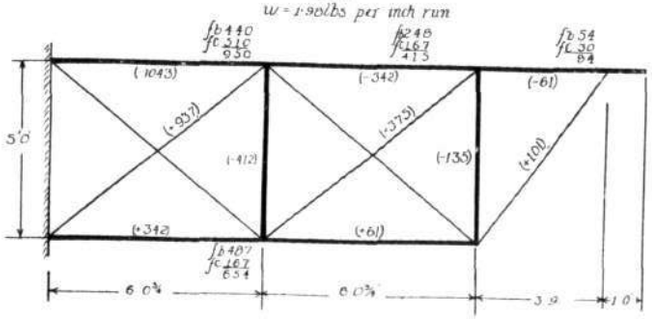



FIG. 5

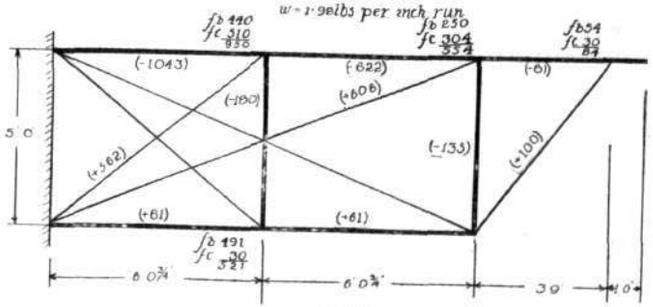



FIG. 6

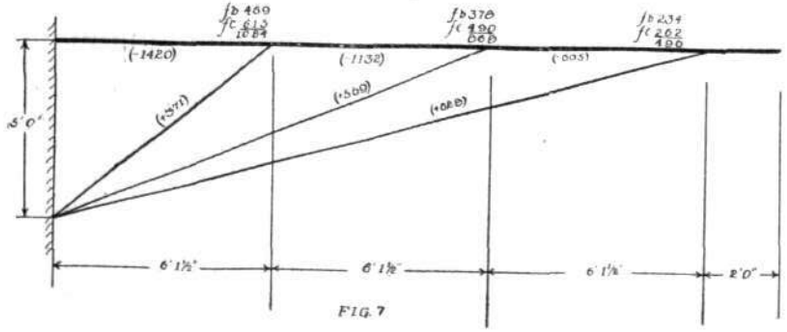



FIG. 7

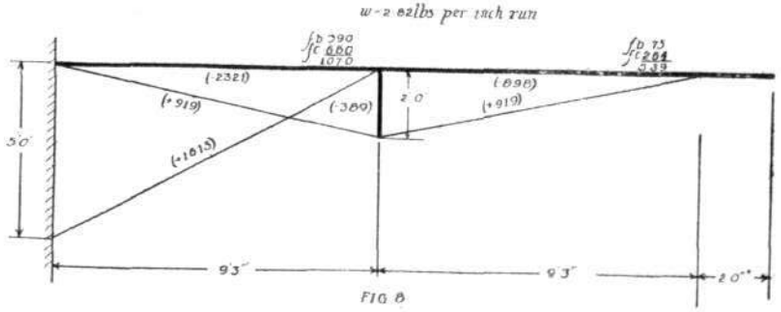



FIG. 8

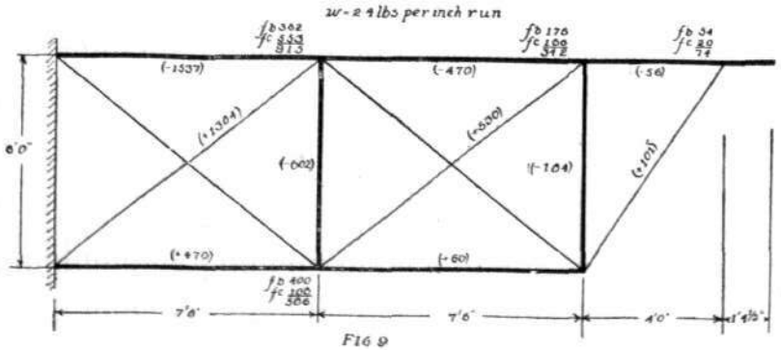



FIG. 9

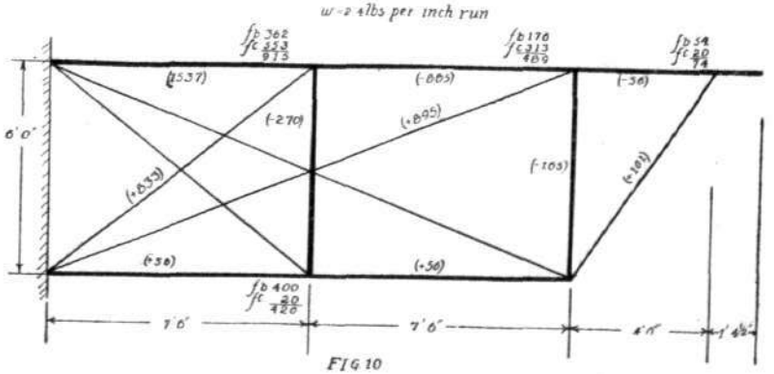



FIG. 10

**Comparison of monoplanes and biplanes, Figs. 1 to 10.**



FLIGHT

(2) The intensity of stress due to the lateral force. This is denoted in the diagram by the letters B M.

The sum of (1) and (2) gives the total intensity of stress in the spar.

In Fig. 14, the depths of the respective spars in the various machines calculated have been drawn to scale. Fig. 13 shows the cross section of the spar. Objection might be raised to the dimensions of this cross section, but for the purpose of comparison an alteration in this respect will not materially affect the result.

Finally, there is the stress diagram for the wing cross section. The distribution of air pressure across the plane section is that obtained on the plane No. 13 *bis* by Eiffel.* From this distribution curve the resultant centre of pressure is obtained at a point ·31 of the chord away from the front edge. The total load per unit length of span on this plane section is taken by the two spars in the inverse ratio of their distances from the centre of pressure.

6. **An Analysis of the Stress Diagrams.**—In looking through the figures for the intensity of stress on the various wing spars it is at once seen that the determining factor in their design is the lateral load causing bending of the spar, not that due to bending owing to the compression. This is especially the case with the large size monoplane, the spar depth necessary to give the requisite strength increasing at a very rapid rate, as will be seen from the lines for 8 and 12 in Fig. 14. This is not quite so pronounced with the monoplanes with ordinary bracing, and could probably be decreased in the king-post type by the use of a slightly increased length of the king-post. From a structural point of view the aerodynamical advantages of a monoplane of very large size would thus be outweighed by the increased weight necessary to give the required spar strength.

The question of providing adequately for the drift force acting on the wing is carefully allowed for in all modern aeroplanes. The ribs give an effective increase of width to the spar flange. Otherwise, the moment of inertia of the section would be small when taken about an axis perpendicular to the one previously considered, and were the drift per unit length of span of large dimensions, there would be here a serious source of plane structural weakness.

* Eiffel, *La Resistance de l'Air et l'Aviation*, 1911, Plate 16 *bis*.

7. **Some Aerodynamical and General Comparisons.**—So long as structural considerations do not limit the size of spars or in other ways affect the design, the monoplane will outclass the biplane by reason of the superiority of its lift for a given wing area, plane area section and angle of inclination. The lift drift ratio will, therefore, also be better, and generally the monoplane will be the more efficient type. In the large monoplane size to obtain sufficient strength it is not only necessary to increase the spar area considerably, but also the span of the machine has to be curtailed so as to bring its size within reasonable limits. This entails a larger chord, and, therefore, a smaller aspect ratio.

For planes of equal aspect ratio span, cross section, and angle of inclination, the monoplane has about 15 per cent. more lift than the biplane for equal speeds through the air, but this advantage may be lost if the aspect ratio had to be reduced from 7 to 4.

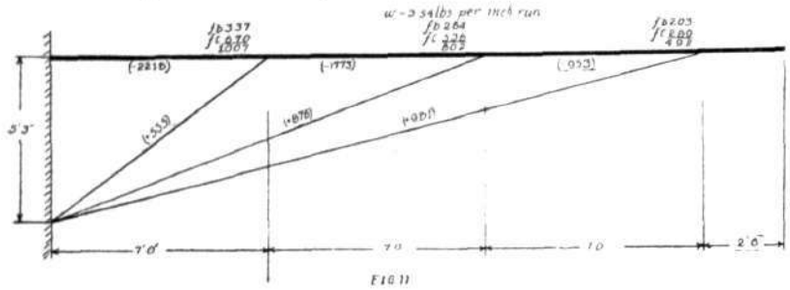



FIG. 11

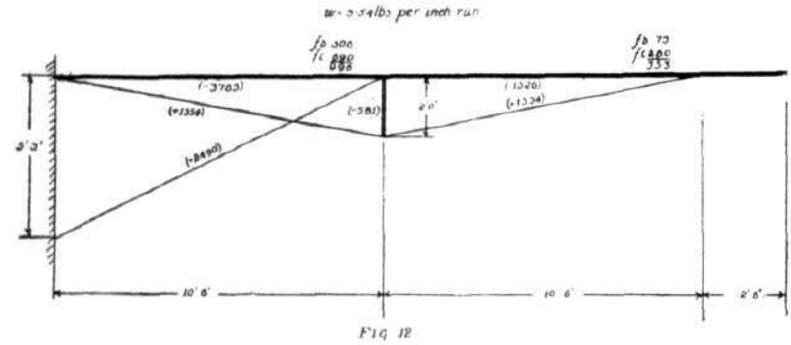



FIG. 12

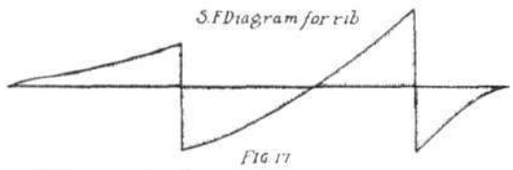



FIG. 17

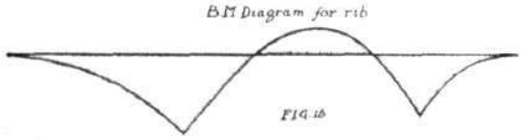
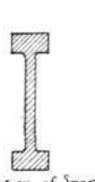



FIG. 18



Section of Spars

FIG. 13

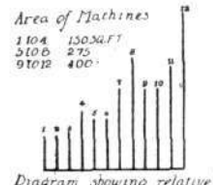



Diagram showing relative sizes of spars

FIG. 14

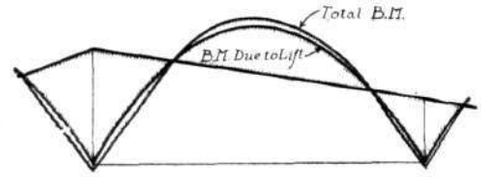
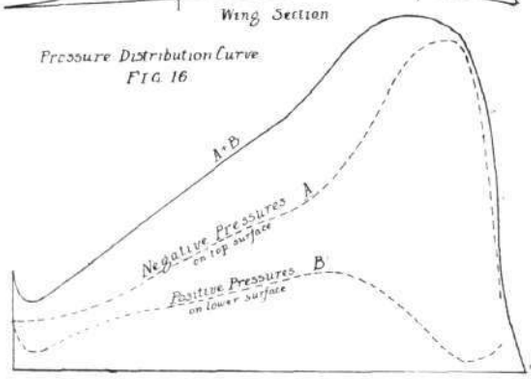



Diagram showing B.M. on part of spar between supports

FIG. 15


Pressure Distribution Curve

FIG. 16




**Comparison of monoplanes and biplanes, Figs. 11 to 16.**

Referring again to the diagram of relative depths of wing spars (See Fig. 14), there is little to choose between the spars for either monoplane or biplane of the smallest size, and the decided aerodynamical advantages of the monoplane type more than point to it as the superior type for this size. The second size would appear to be equally suited, whether as a monoplane or biplane. This is for a machine carrying about 1,400 to 1,500 lbs. load. For the largest size of machine the balance would seem to lie in favour of the biplane.

When the results are generally reviewed from this diagram it would appear that a limit will be first reached for monoplanes. As more load is carried a limit would be reached with biplanes, and it would be more economical to employ the multiplane machine. This point has not yet been reached in practice. In many other ways this distribution of the types would appear to fit in well with the requirements. A small machine is essentially one that can easily be carried about, and very quickly erected. There is not the same necessity for the larger size of machines to be so easily packed, and consequently there is not much advantage in a monoplane from this point of view in the larger sizes.

A biplane has a greater resistance than the corresponding monoplane, but the difference is not very great. What in the monoplane one gains by having no plane struts is lost by the increased size of the chassis members for a given diameter and arrangement of propeller.

For machines of area up to 250 or 275 sq. ft. a monoplane is the most economical type. From this point onward the biplane holds the field.

# Models

Edited by V. E. JOHNSON, M.A.

## Some Remarks on Stability.

THE question of stability is one of the most important in the whole of aeronautics; naturally it is one of the most difficult.

In the first place, what do we mean by the term "stability"? At first sight the answer to this question is not apparently a very difficult one, and one would naturally expect to find a common agreement as to what stability was or should be, although there might and probably would be considerable diversity as to the best means to obtain the same. But the actual personal experience of the writer is that such is by no means the case. Not only do no two people seem to hold the same views with regard to how stability should be obtained, but they do not even hold the same views or mean the same thing by the term. Is it not curious that in more than one well-known work on stability no actual definition of the word is given, *i.e.*, the author's definition, his personal idea of stability? Apparently there is an assumption that there is a generally accepted idea as to the meaning of the word stability. The writer's experience is against this (so far, at any rate, as aero-modellists are concerned), or that if there is a general concensus of opinion, it by no means follows that it is the correct one.

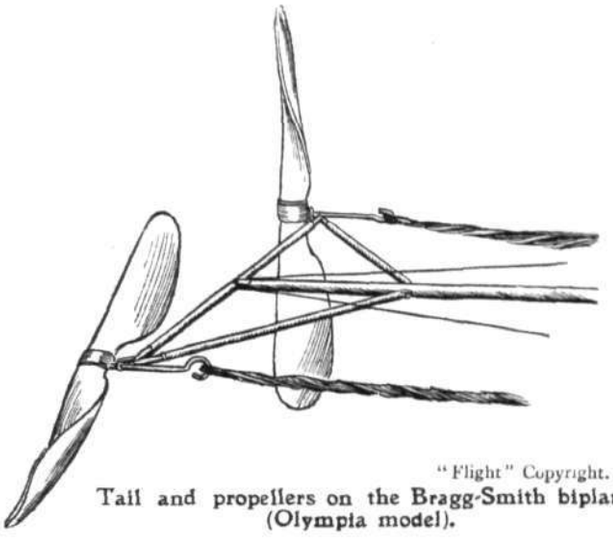
The subject is such an important one that I propose to go into it a little in detail. Let us first take the ordinary dictionary definition of the word. Nuttall gives the following:—*stableness*, *firmness*, *steadiness*. The last term should be especially noted.

In "Principles of Flight," p. 36, we find under the heading "*Stiff and Rolling Stability*": stability is, of course, a relative term. Perfect natural stability would presumably mean that the machine is absolutely stiff in the air; that the righting and disturbing forces synchronise under all possible conditions. As at present understood, a naturally stable system is expected to pitch or roll to a certain extent in order to recover equilibrium. A machine that is stiff in the air would never lose its equilibrium. The writer's experience is that *stability* and *steadiness* are generally accepted as the same thing. Certainly most judges in model competitions appear to take this view.

Personally it appears to be most desirable to separate the two and admit with the author of the "Principles of Flight" the existence of two forms or types of stability, stiff or (say) steady stability and rolling stability. It is quite an error to suppose that an aeroplane is necessarily unstable because it rolls. Ships roll but are not unstable in consequence. Ships can be *steadied* by means of gyroscopes (Schlick method); in the case of one vessel experimented on the "See-Bar," the rolling was actually reduced from some 25° to 30° to about 1°; in other words, the vessel was rendered perfectly *steady*. But what is the practical result of so steadying vessels in the long run, nothing more nor less than the causing of enormous strains and stresses on the vessels and their ultimate breaking up under the action of the waves.

The chief factor in the *steadying* of an aeroplane is *speed*, and the same is true of any other form of locomotion.

A rather remarkable practical instance of this question of steadiness and stability was afforded at the recent hydro-aeroplane competition at the Welsh Harp.

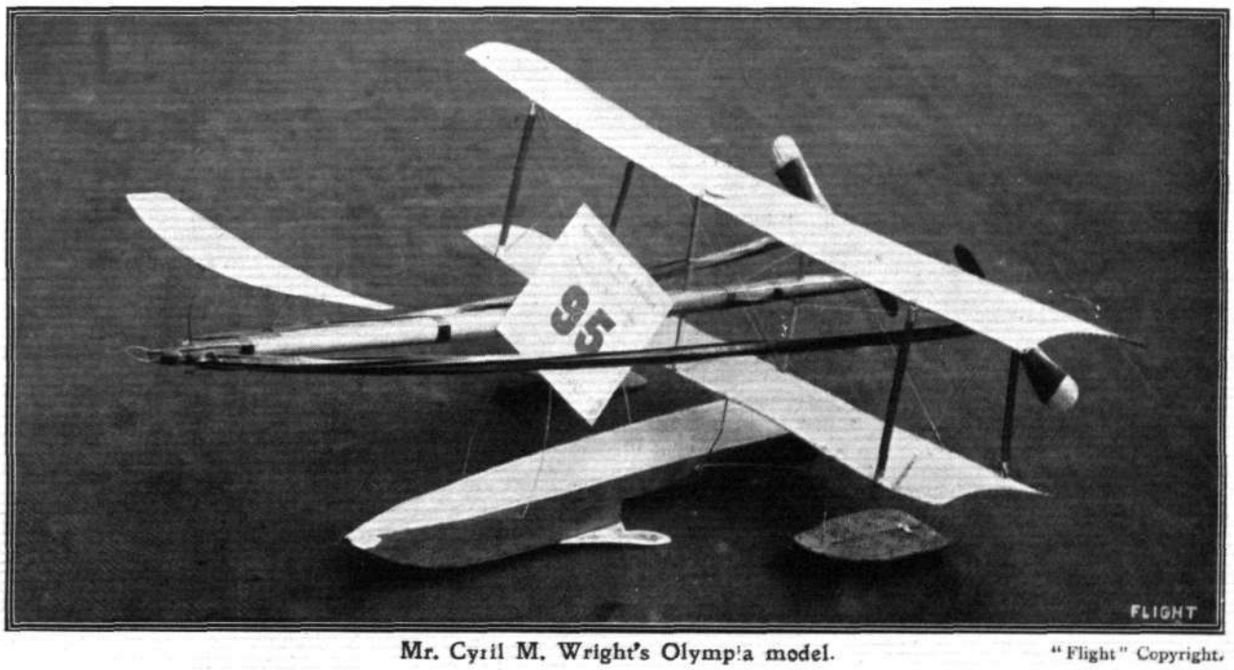


"Flight" Copyright.

**Tail and propellers on the Bragg-Smith biplane (Olympia model).**

The *steadiness* exhibited by the models generally in actual flight was very much better than that exhibited at previous competitions; generally speaking, the models were more or less quick-flying ones. The model flown by Mr. Bragg-Smith was, however, an exception—being perceptibly slower in flight; during one flight—the only one actually witnessed by the writer—the model rolled considerably, never, however, beyond a certain angle. More than one competitor observed to another: "Well! I don't think much of Bragg-Smith's stability to-day, at any rate."

But was the model less *stable* because it rolled, because it exhibited the rolling stability of slow flight rather than the "stiff or



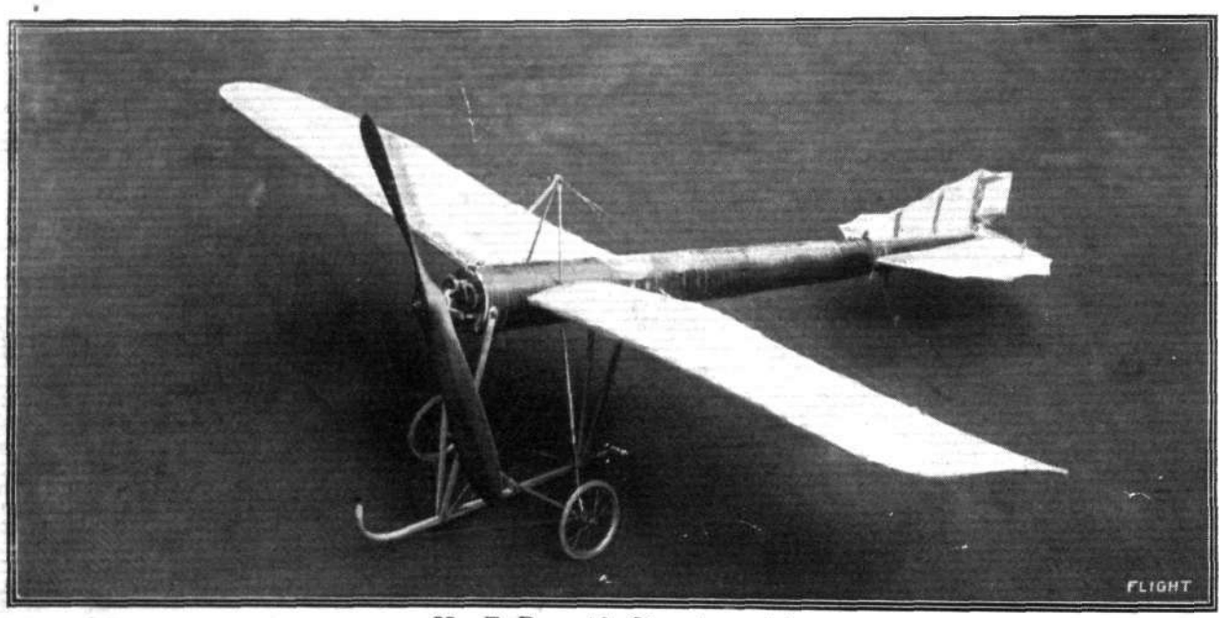

**Mr. Cyril M. Wright's Olympia model.** "Flight" Copyright.

steady" stability of accelerated speed? Personally we should say most decidedly not: or, at any rate, that such a conclusion most certainly does not follow as a matter of course.

A year or so ago the writer was one of the judges in a competition in which Mr. E. W. Twining was the other. So many marks had to be allotted for stability. On discussing this question, we found that our ideas were, practically speaking, the same, and that we were neither of us prepared to classify a model as necessarily unstable, or, indeed, lacking in stability because it either rolled or pitched, of course within certain limits. In the case of a model which "phugoids" or switchbacks, the cause generally is that the elevator is set at too great an angle, and when this is corrected the "phugoids" disappear. The *design* of the model is not incorrect, nor is it correct to classify the model as naturally unstable with the foregoing.

In any model competition it is most important that the judges should be sufficiently competent to distinguish between the two. It is also most important that they should be agreed as to whether the models are being marked for stability or for steadiness pure and simple. We have frequently heard the remark, "Oh! yes, but the second flight (say) was not so stable (in reality so steady) as the first."

In order to avoid any possible misunderstanding or difficulty in the case of the competition on September 20th for single screw hydro-aeroplanes (which was originated by the writer), he specially used the expression, "steadiness in flight" in preference to the usual term "stability." In this competition, either rolling or pitching means loss of marks.




**Mr. E. Renault's Olympia model.** "Flight" Copyright.

Very much more might be said on the subject, but having set the ball rolling we should be glad of the opinion of some of our readers on this all-important point.

### The Question of Weight.

The theoretical reason why weight is such an all-important item in model aeroplaning, more so than in the case of full-sized machines, is that, generally speaking, such models do not fly fast enough to possess a high weight carrying capacity. The writer knows of frequent cases in which novices have failed disastrously—because their machines have been too heavy. Lightness and flimsiness are not of necessity at all the same thing. A bird's quill is marvellously light—but not even a weight fanatic could term it flimsy. More than one aeromodellist has candidly confessed to me that they cannot build light machines—light, that is, in proportion to their size, the actual weight, 4 oz., 8 oz., 1½ lbs., has nothing to do with the subject—otherwise than in relation to size. In aeronautical work—maximum strength is required—but it must be accompanied with minimum weight: which result can only be obtained

(1) By a knowledge of materials.

(2) And of how to combine these materials in the most efficient and skilful manner. The writer has always, from the time when he wrote his first article on model aeroplanes, advised the builder to "keep down the weight," in proportion to the size, that is. Every additional superfluous ounce of weight is not only another ounce to carry, necessitating more weight in the extra power needed, but it is also an additional ounce to land successfully without damage at the end of the flight.

Not infrequent references have more or less recently been made to record-making models, which would lead the uninitiated to conclude that such models owe their success to the simple fact that in such models the weight has been cut down to the very last gramme, and that such are in truth but very flimsy affairs. As a matter of fact, nothing could be more erroneous. Such models almost invariably exhibit, not only a knowledge of materials and how to combine them to get the best results, but first-class workmanship and finish and a high degree of accuracy in essential details, which we regret to say many so-called scientific models which we have seen do not. Such models do not smash themselves up on landing, and are as different from certain types of (really) flimsy foreign products as chalk from cheese. We do not think it too much to say that a very high degree of mechanical skill, judicious reasoning and close and accurate powers of observation are required to attain such results. Referring for a moment to another matter, viz., the amount of detail which should be put into a model. Because (to take a purely imaginary case) each wing on a full-sized machine contains (say) 12 ribs, we do not see that that is any reason why a model should do the same; when all the requisite strength and rigidity, &c., can be obtained by the use (say) of 3.

Whatever the expert may do, the novice should certainly build his model of minimum permissible weight—if he wishes to avoid either failure or disappointment.

What we would like to see more in evidence is not of necessity *proportionately* heavier machines; but one that possesses a greater span, a span, say, of from 5 to 6 ft., or even more. Why? is a question which we leave over until our next issue.

### Tractors *v.* Propellers.

A correspondent (Mr. Allan D. Coakes) forwards us the following communication on the above: "My early experiments were all made with tractor models, and by 1910 I had obtained flights of 90 yds., hand launched, and 45 yds. r.o.g. I then was struck with the 1—1—2 P—0 craze, but not before I had arrived at the conclusion that the tractor type were quite easy to fly, provided they were well-surfaced and the screw-pitch kept small.

"When reading some of the letters appearing in FLIGHT, it is not quite clear whether the writers are referring to the efficiency of the machines as a whole, *i.e.*, tractor models and models of the propeller type, or merely to the screws themselves [to the machines as a whole]. I take it that the question is, which is the most efficient machine as a whole? Of course the efficiency of the screw, whether propeller or tractor, has a large bearing upon the efficiency of the machine as a whole, but it must be remembered that there are other factors as well as the motive power, such as head resistance, angle of incidence of surfaces, &c. As regards head resistance, I think it is admitted that it is easier to design a tractor machine with a good streamline form than a propeller machine; but even then, if there is any slip stream from the tractor, and I have never heard of one yet, however well designed, which did not produce a slip stream, it is bound to a certain extent to increase the head resistance, and retard

the forward motion of the model. On the other hand, the propeller is working in air, which has already a certain amount of forward motion imparted to it by the friction of the machine in passing through it, and I believe, and I am not alone in this respect, it is possible for a well-designed propeller driven model to attain a speed in still air which is very nearly equivalent to the pitch of the propeller x r.p.m., and thus show an apparent propeller efficiency of nearly 100 per cent. Personally I am of opinion that it is useless to apply a formula to try and find out the relative efficiency of propellers and tractors by taking results from machines of each type unless allowance is made for the difference in design and head resistance, since what we wish to arrive at is the efficiency of an ideal tractor type model and an ideal propeller type model, and to obtain this every factor must be known and taken into account in calculating the efficiency; a mere multiplying of the weight of the model by the distance flown and dividing by the weight of rubber shows nothing, as it makes no allowance for the way the weight is disposed, and to get at a true result it would be necessary first of all to calculate the head resistance, &c., of the two machines used for comparison, and include this in the formula for arriving at their relative efficiency.

"I may say, I think the tractor type model is far more interesting and worthy of serious consideration than the propeller type, but I fear, up to the present, the competitions have not helped it along very much."

### The Preservation of Rubber.

Mr. Harold T. Holman writes as follows:—"I notice that many aeromodellists put their machines away with the rubber stretched on the frame, and sometimes leave the frame exposed to the sun's rays. This is most surely very detrimental to the rubber. I should therefore be glad if you would let me know what is the best way to store rubber when not in use so that it does not deteriorate in any way or lose its propulsive powers. I am sure a good proportion of model fliers do not trouble about the most important item, the rubber motor, and so their success is not as good as it might be. I think, therefore, that the particulars requested would be of use to many others."

After being used the rubber should be at once removed from the machine; every time the rubber is wound up, some of the strands, owing to their position relative to the others, receive more strain, and a readjustment of the rubber would no doubt be advantageous after every flight. After removal from the machine, place the rubber in a tin case or can with a tight-fitting lid.

On no account should the rubber be exposed to the sun or indeed any actinic rays more than possible, but kept in a cool place at as even a temperature as can conveniently be done. It should be washed in warm soda water if it becomes at all greasy. However much care be taken of it, it lasts, however, only a certain time, *i.e.*, one season's rubber is no use for the next, any more than a tennis ball is; but the amount of work that can be got out of it—*i.e.*, the number of times that it can be used—very much depends on the care taken of it, the thoroughness with which it is lubricated, and the number of turns given to it.

### Egg-Beaters as Winders.

We have received the following from Messrs. J. Bonn and Co. (97, New Oxford Street): "Just a remark in reference to your article in FLIGHT on Mr. Macdonell's twin winder. The egg-beater was supplied by Mr. Macdonnell, and was converted according to his instructions. As we believe you are aware, we do not specialize in egg-beaters, but are prepared to do any work to customer's instructions."

## KITE AND MODEL AEROPLANE ASSOCIATION.

*Official Notices.*

**British Model Records.**

| | | | | |
|---|---|---|---|---|
| Hand-launched | Distance | R. Lucas | ... | 590 yards. |
| | Duration | A. F. Houlberg | | 89 secs. |
| Off ground | Distance | C. C. Dutton | ... | 296 yards. |
| | Duration | A. F. Houlberg, J. E. Louch | ... | 80 secs. |
| Hydro, off water | Duration | F. Whitworth | ... | 37 secs. |
| Single-tractor screw, hand-launched | Distance | F. G. Hindsley | ... | 173 yards. |
| | Duration | J. E. Louch | ... | 68 secs. |
| Do., off ground | Duration | J. E. Louch | ... | 45 secs. |

**Official Trials.**—On June 21st the official observers attended the ground of the Hendon and District club, for the purpose of observing flights for distance and duration for registration and establishing records. The observers were Messrs. F. G. Hindsley (Aero Models) and W. H. Akehurst. The results were:—Duration off ground: C. C. Dutton, 64 secs.; J. Doidge, 65 secs.; J. E. Louch and A. F. Houlberg, who tied with 80 secs. Distance off ground: C. C. Dutton, 296 yards. Hand-launched duration: J. E. Louch, 85 secs. The flying was excellent, and the distance record which has stood so long to Mr. Rowland fell to C. C. Dutton, of Paddington club. The duration record off ground, held by J. E. Louch with 68 secs., was beaten by himself with 80 secs., and Mr. Houlberg also tied; therefore they hold the record jointly. The next trials will be held on Wimbledon Common on July 26th.

**Model Competition** on the 100-Acre Field, Greenford (Station: Perivale Halt, *via* Westbourne Park), July 12th, at 3 p.m. Entries close July 5th. Steering competition for models rising off the ground. Free to members; non-members entrance fee, 2*s*. Prizes: 1st, cup; 2nd, silver medal of the association; 3rd, bronze medal of the association. Tests: A—Straight flight ahead. B—Circular flight to the right. C—Circular flight to the left. Maximum marks, 150—50 for each test. Rules: 1. To qualify for Test A models must fly straight for not less than 50 yds. 2. To qualify for Tests B and C models must make at least one complete circle, which, in the estimation of the judges, shall be approximately 50 yards in diameter. 3. Competitors may submit models of any kind. 4. Models must not weigh less than 6 ozs. 5. Competitors must be at the judges' flag at 2.30 sharp. Those not present at that time will be disqualified. 6. Reasonable repairs will be allowed at the discretion of the judges. 7. Competitors will not be allowed to replace any part (or parts) without permission of the judges. 8. Each competitor is entitled to three trials, if time permits.

**Research Committee.**—A research committee has been appointed for carrying out research work: Dr. A. P. Thurston, D.Sc., A.F.Ae.S., H. H. Groves, F. Mayer, V. E. Johnson, M.A., A. E. Houlberg, G. Rowlands. The committee has been specially appointed to carry out the research work that is necessary with regard to model aeroplane and aero engines, and will, it is hoped be able to work in conjunction with other research committees.

**Secretaries' Guild.**—By request this guild has been approved by the Council, and it is hoped that the secretaries of the various affiliated clubs will, by meeting together and discussing various matters, be able to help each other, and also to help the council by their suggestions. It was suggested by W. H. Norton, hon. sec. Reigate, Redhill and District Aero Club; and the hon. sec., W. H. Akehurst, will be pleased to hear from all affiliated secretaries as soon as possible, giving the most suitable days for meeting. As all the clubs affiliate, so the hon. secretaries will become members of the guild; their plan of action will be decided at the first meeting.

27, Victory Road, Wimbledon, S.W. W. H. AKEHURST, Hon. Sec.

## AFFILIATED MODEL CLUBS DIARY.

**CLUB reports of chief work done will be published monthly for the future. Secretaries' reports, to be included, must reach the Editor on the last Monday in each month.**

**Leytonstone and District Aero Club (64, LEYSPRING ROAD).**

JUNE 28TH, model flying near Brickfields, 3 p.m. Sunday, June 29th, 6.30 a.m., Model Yacht Pond, 10 a.m., near Brickfields.

**N.E. London Model Ae.C. (57, KING SQ., GOSWELL RD., E.C.).**

JUNE 28TH, flying on Hackney Marshes at 3 p.m.; June 29th, 10 till 1 p.m.

**Paddington and Districts (77, SWINDERBY ROAD, WEMBLEY).**

JUNE 28TH. Flying will take place on the old ground from now onwards, the hay having been cleared off. An inter-club contest with the Aero Models Association will take place at an early date; details will be announced next week.

**Wimbledon & District (59B, ST. PHILLIP'S ST., LAVENDER HILL).**

FLYING June 28th, 3 o'clock; June 29th, 11 and 3 o'clock.

## UNAFFILIATED CLUB.

**S. Eastern Model Ae.C. (1, RAILWAY APPROACH, BROCKLEY).**

SATURDAY June 28th. Flying, 4.30 to 7.30 p.m., at pond at Croydon end of Mitcham Common. Last day for South Eastern Trophy. No qualifying flights will be timed after 5.30. Other flying at Woolwich, Blackheath and Brockley.


"Flight" Copyright.

**The trophy competed for in connection with the South Eastern Model Club.**

# CORRESPONDENCE.

## Committee Elections.

[1766] The members of the Royal Aero Club, and also those of other clubs and societies, should be indebted to you for dealing so fully with the above subject in your issue of May 31st. It is very necessary that the powers of a committee or council should be ample, but the greater their powers the more necessary it is that the members should have complete control of the election of their executive body.

With regard to your criticism of the system of balloting, by which a member is not compelled to vote for candidates who are unknown to him, there is so much to be said in reply that I scarcely know which point to take first, though I am glad to see you are now agreed that the two systems are fundamentally different. In your original notice of the change (FLIGHT, March 29th, 1913, page 357) your words were: "Mr. A. S. E. Ackermann proposed a *slight* alteration to the rule dealing with invalid ballot papers for the election of the committee. This was agreed to." It was in consequence of the change being thus treated as slight that I wrote in your issue of April 12th, "Hence the change, though slight in words, is *very important in character*." Why you should be so unboundedly surprised at the members of the Royal Aero Club adopting a rational system when its merits and the defects of the old mob voting system were briefly pointed out to them, I do not know.

It must be remembered too that though nine members were bold enough to vote for the old system, not one of them was audacious enough to attempt to say one single word in support of the old system, while the rational system immediately received the verbal support of a member who is still unknown to me and was carried by 23 votes to 9.

In the example of three candidates which you give on page 579 of FLIGHT of May 31st, you say: "Each has an established right to one-third of each elector's voting power." Why should each candidate receive *exactly* the same number of votes, and would it not be very awkward if this occurred? Surely some men are at once recognised as better than others to serve on a committee, and under a rational system they naturally receive more votes than the other candidates, and this is what a true ballot is for. But though you claim "an established right" to equality in the example you give an inequality, viz., A 280 votes, B 270 votes, and C 260 votes. If some 300 or more members have voted in these proportions, by what law of averages would the last 21 all vote for C? Alternatively you assume that A and B are not known to the 21 electors, while C is, and yet you expect them (nay, would *force* them) to vote for these two candidates who are unknown to them. Could anything be more illogical? Why should a member not have the right to withhold his vote in respect to any candidate, especially an unknown one?

The word "majority" is surely strangely used on page 580? In that case C gets 281 votes, A 280 votes, and B 270 votes, so C and A have the majority. Please note, also, that the "established right" to equality claim is more nearly satisfied by 281, 280 and 270 than by 287 ( $= 280 + \frac{21}{3}$ ); 277 ( $= 270 + \frac{21}{3}$ ) and 267, for which you argue! By the old system members were compelled to vote as effectively for candidates who were unknown to them as for those who were well known. This is obviously irrational. By the rational system a candidate gets exactly those votes which the members intend him to get, and to say that because one candidate under this system gets more votes than another, therefore he has been elected by a clique, is absurd, unless clique is here used as a synonym for majority.

With regard to your last paragraph, is it rational *to have to select* one of two committee men (*neither* of whom is known to you) by the toss of a coin? Is the work of the Club Committee so unimportant that it is not worthy of a more brainy selection than the chance fall of a mere coin. And by what logic is "one under the painful necessity of withdrawing one's support from dear old Brown"?

The whole principle is now, and should be, "Support those you know are good men, and don't be *forced* to support those you don't know," even if in fact, and unknown to you, they may also be good.

I would again refer you and your readers to the arithmetical demonstration on page 147 of *Engineering*, of January 30th, 1908, of how the mob voting system most effectively prevents the members of an institution from exercising their legitimate choice of their council, though most members are under the impression that they are exercising that free choice to which, of course, they, as forming the club, or institution, are entitled.

A. S. E. ACKERMANN.

June 9th.

## Aerial Defence and Public Apathy.

[1767] It is stated that the appeal recently addressed by the Imperial Maritime League to the Mayors of large towns and Lord-Lieutenants of British counties suggesting co-operation in aerial defence has fallen almost entirely on deaf ears.

May I suggest that this public apathy is due to public ignorance? To the majority of the public dirigible airships are almost a myth, and are certainly not regarded as present-day practical realities. No belief in the urgent necessity for facing this factor in the aerial problem will be aroused until the public have ocular demonstration of the uses and possibilities of airships.

No doubt the want of the driving power of public opinion is also at the back of the slowness of the Government to move in the matter.

As a commercial proposition, dirigible airships on the Continent are making good profits from carrying passengers and displaying advertisements. A service of such airships in this country should prove a similar success, and, while awakening public interest, would at the same time afford a means of providing a training-school for pilots and airmen, and an opportunity for the foundation of an airship-building industry in Great Britain.

As a commercial man, "patriotism with 10 per cent." might rouse even John Bull from his slumbers.

39, Lombard Street, E.C. E. C. POWELL.

## *Daily Mail* by Aeroplane, Paris–London.

CONGRATULATIONS to Mr. Robert Slack, the I.C.S. pilot, upon his fine flight, against such severe meteorological conditions, from Paris to Hendon, on Wednesday this week, on a Morane-Saulnier, carrying with him copies of the Paris *Daily Mail* for the King and the French President. Leaving Paris at 4.15 a.m., he arrived at Hendon at 1.39 p.m., having made stops at Folkestone and Headley.

## Illness of Lieut. Porte.

MANY of our readers, especially those who have admired Lieut. Porte's fine flying on the Dep., will be glad to hear that the serious operation to his jaw which he underwent a day or so ago was successful, and this popular pilot is now making good progress towards complete recovery.

## NEW COMPANY REGISTERED.

**London Aerodrome Club, Ltd.**, Moorgate Station Chambers, Moorfields, E.C.—Capital £20,000, in £1 shares. Formed to provide a clubhouse at the London Aerodrome, at Hendon, or elsewhere. No person other than a member of the club (except the Grahame-White Aviation Co., Ltd.) shall be a shareholder, and no persons other than shareholders shall be eligible for membership of the club.

## Aeronautical Patents Published.

**Applied for in 1912.**

*Published June 19th, 1913.*

12,148. S. F. CODY. Aerial craft.
12,632. H. PIPPART AND H. NOLL. Flying machines.
12,648. G. H. CURTISS. Aerial machines.
16,168. S. E. MAZZALA. Dirigible balloons.
18,816. F. GRAGES. Parachute flying apparatus.
24,925. J. PARSON. Aerial machines.
25,387. E. H. KELSEY. Flying machines.

**Applied for in 1913.**

*Published June 19th, 1913.*

1,606. W. J. WELLS AND D. LEWIS. Dirigible balloons.
4,025. C. A. LEWIS. Airships.
4,915. LUFT-FAHRZEUG-GES. Airship envelopes.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